LANTRONIX®

EDS Device Servers and Terminal Servers

User Guide

- EDS4100
- EDS8PR
- EDS16PR
- EDS32PR
- EDS8PS
- EDS16PS

Part Number 900-433
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Disclaimer

This product has been designed to comply with the limits for a Class B digital device pursuant to Part 15 of FCC and EN55022:1998 Rules when properly enclosed and grounded. These limits are designed to provide reasonable protection against radio interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with this guide, may cause interference to radio communications.

The information in this guide may change without notice. The manufacturer assumes no responsibility for any errors that may appear in this guide. For the latest revision of this product document, please check our online documentation at www.lantronix.com/support/documentation.html.

Revision History

Date	Rev.	Comments
3/06	A	Initial Document
10/06	B	EDS16PR and EDS32PR products added.
12/06	D	German and English TUV certification added.
1/07	E	EDS8PR products added.
11/07	F	Added LPD, Terminal, Host, RSS, and RTC pages; updated; XML and other pages.
11/08	G	EDS8PS and EDS16PS products added.
5/09	H	Updated for EDS8/16/32PR & EDS4100 v4.1.0.2

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1: Using This Guide

Purpose and Audience

This guide provides the information needed to configure, use, and update the EDS™ Device Server. The intended audience is users who will use the EDS to network-enable their serial devices.

Summary of Chapters

The remaining chapters in this guide include:

Chapter	Description
2. Introduction	Main features of the product and the protocols it supports. Includes technical specifications.
3. Installation of EDS8PS and EDS16PS	Installing the EDS8PS and EDS16PS device servers.
4. Installation of EDS4100	Installing the EDS4100 device server.
5. Installation of EDS8PR, EDS16PR, or EDS32PR	Installing the EDS8PR, EDS16PR and EDS32PR device servers.
6. Using DeviceInstaller	Locating an EDS unit and viewing its properties and device details.
7. Configuration Using Web Manager	Configuring the EDS using Web Manager.
8. Network Settings	Configuring the EDS for Ethernet.
9. Line, Tunnel, Terminal, and Host Settings	Status and statistics for each of the serial lines (ports). Changing the character format and Command Mode settings for them.
10. Services Settings	Active run-time settings for various system protocols.
11. Security Settings	Protocol settings for managing the security of data transmissions over the Internet.
12. Maintenance and Diagnostics Settings	A variety of tools for configuration, diagnostics, and statistics.
13. Advanced Settings	Information for advanced configuration activities, modes, and statistics.

Chapter	Description
14. Tunneling	Tunneling allows serial devices to communicate over a network, without "being aware" of the devices which establish the network connection between them.
15. Security in Detail	Configuring the EDS for SSH or SSL security.
16. Branding the EDS	Customizing the EDS Web Manager and Command Line Interface (CLI).
17. Updating Firmware	Obtaining up-to-date firmware and release notes.
A: Technical Support	Contacting Lantronix Technical Support.
B: Binary to Hexadecimal Conversions	Converting binary values to hexadecimals.
C: Lantronix Cables and Adapters	Lantronix cables and adapters for use with the EDS devices are listed here according to part number and application.
D: Compliance	Compliances according to ISO/IEC Guide 22 and EN 45014.
E: Warranty	Lantronix Warranty Policy link.
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Additional Documentation

The following documents are available on the product CD and the Lantronix Web site (www.lantronix.com):

Document	Description
EDS 8/16 Quick Start	Information about the EDS hardware installation and initial configuration of your EDS8PS or EDS16PS.
EDS Command Reference	Instructions for accessing Command Mode (the command line interface) using a Telnet connection or through the serial port. Detailed information about the commands. Also provides details for XML configuration and status.
Com Port Redirector Quick Start and Online Help	Instructions for using the Lantronix Windows-based utility to create virtual com ports.
DeviceInstaller Online Help	Instructions for using the Lantronix Windows-based utility to locate the EDS and to view its current settings.

2: Introduction

This chapter introduces the Lantronix EDS family of device servers. It provides an overview of the products, lists their key features, and describes the applications for which they are suited.

EDS is a unique, hybrid Ethernet terminal and multi-port device server product designed to remotely access and manage virtually all of your IT/networking equipment and servers. It is also designed to provide connectivity for edge devices such as medical equipment, kiosks, POS/retail terminals, security equipment, and more.

EDS device servers contain all the components necessary to deliver full network connectivity to virtually any kind of serial device. They boast a reliable TCP/IP protocol stack, a variety of remote management capabilities, and an innovative design based on the leading-edge Lantronix Evolution OS™.

Delivering a data center-grade, programmable device computing and networking platform for integrating edge equipment into the enterprise network. Rack-mountable EDS models are available in 8, 16, and 32 port configurations. Desk top EDS models are available in 4, 8, and 16 port configurations.

EDS8PS and EDS16PS Overview

The EDS8PS (8 serial ports) and EDS16PS (16 serial ports) are compact desktop device servers that give you the ability to network-enable asynchronous RS-232 serial devices. They provide fully transparent RS-232 point-to-point connections without requiring modifications to existing software or hardware in your application.

Figure 2-1. EDS8PS Device Server

Features

Key features of the EDS8PS and EDS16PS include

- Dual-purpose Ethernet terminal server and device server design.

- 8 (EDS8PS) or 16 (EDS16PS) serial ports with hardware handshaking signals.
- RS-232 support.
- An RJ45 Ethernet port.
- 8 MB Flash memory.
- 32 MB random access memory (RAM).
- Lantronix Evolution OS™.
- A dedicated console port.
- AES, SSH, or SSL secure data encryption.
- Three convenient configuration methods (Web, command line, and XML).
- Print server functionality (LPR/LPD).

See Chapter 3: Installation of EDS8PS and EDS16PS for installation instructions.

EDS4100 Overview

The EDS4100 is a compact device server that allows you to network-enable asynchronous RS-232 and RS-422/485 serial devices. It can deliver fully transparent RS-232/422 point-to-point connections and RS-485 multi-drop connections without requiring modifications to existing software or hardware in your application.

- Ports 1 through 4 support RS-232 devices.
- Ports 1 and 3 also support RS-422/485.

***Note**: RS-485 circuits support 32 full-load devices or 128 quarter-load devices. Each RS-485 port, however, counts as one device, leaving up to 31 full-load or 127 quarter-load devices that can be connected to the RS-485 circuit.*

The EDS4100 device server supports the Power-over-Ethernet (PoE) standard. With PoE, power is supplied to the EDS over the Ethernet cable, by either an Ethernet switch or a midspan device. Being able to draw power through the Ethernet cable eliminates power supply and cord clutter. It also allows the EDS to be located in areas where power is not typically available.

Figure 2-2. EDS4100 4 Port Device Server

Features

The key features of the EDS4100 include

- Dual-purpose Ethernet terminal server and device server design.
- Four serial ports with hardware handshaking signals.
- RS-232 and RS-422/485.
- One RJ45 Ethernet port.
- IEEE 802.3af standard for Power-over-Ethernet (PoE).
- 8 MB Flash memory.
- 32 MB Random Access Memory (RAM).
- Lantronix Evolution OS™.
- AES, SSH, or SSL secure data encryption.
- Three configuration methods (Web, command line, and XML).
- Print server functionality (LPR/LPD).

See Chapter 4: Installation of EDS4100 for installation instructions.

EDS8PR, EDS16PR, and EDS32PR Overview

The EDS8PR (8 serial ports), EDS16PR (16 serial ports), and EDS32PR (32 serial ports) are compact easy-to-use, rack-mountable device servers that give you the ability to network-enable asynchronous RS-232 serial devices. They provide fully transparent RS-232 point-to-point connections without requiring modifications to existing software or hardware components in your application.

Figure 2-3. EDS16PR Device Server

Features

The key features of the EDS8PR, EDS16PR, and EDS32PR include

- Dual-purpose Ethernet terminal server and device server design.
- 8 (EDS8PR), 16 (EDS16PR) or 32 (EDS32PR) serial ports with hardware handshaking signals.
- RS-232 support.
- One RJ45 Ethernet port.
- 8 MB Flash memory.
- 32 MB Random Access Memory (RAM).
- Lantronix Evolution OS™.
- A dedicated console port.
- AES, SSH, or SSL secure data encryption.
- Three configuration methods (Web, command line, and XML).
- Print server functionality (LPR/LPD).

See Chapter 5: Installation of EDS8PR, EDS16PR, or EDS32PR on page 33, for installation instructions.

Protocols Supported

The EDS contains a full-featured TCP/IP stack. Supported protocols include:

- ARP, IP, UDP, TCP, ICMP, BOOTP, DHCP, Auto IP, Telnet, DNS, FTP, TFTP, HTTP(S), SSH, SSL/TLS, SNMP, SMTP, RSS, PPP, and Syslog for network communications and management.
- TCP, UDP, TCP/AES, UDP/AES, Telnet, SSH, and SSL/TLS for tunneling to the serial port.
- TFTP, FTP, and HTTP for file upload.
- FTP and HTTP for firmware upgrade.

Evolution OS™

EDS incorporates The Lantronix Evolution OS™. Key features include

- Built-in Web server for configuration and troubleshooting from Web-based browsers.
- CLI configurability.
- SNMP management.
- XML data transport and configurability.
- Really Simple Syndication (RSS) information feeds.
- Enterprise-grade security with SSL and SSH.
- Comprehensive troubleshooting tools.

Additional Features

Modem Emulation

In modem emulation mode, the EDS can replace dial-up modems. The unit accepts modem AT commands on the serial port, and establishes a network connection to the end device, leveraging network connections and bandwidth to eliminate dedicated modems and phone lines.

Web-Based Configuration and Troubleshooting

Built upon Internet-based standards, the EDS enables you to configure, manage, and troubleshoot through a browser-based interface accessible anytime from anywhere. All configuration and troubleshooting options are launched from a web interface. You can access all functions via a Web browser, for remote access. As a result, you decrease downtime (using the troubleshooting tools) and implement configuration changes (using the configuration tools).

Command-Line Interface (CLI)

Making the edge-to-enterprise vision a reality, the EDS with the Evolution OS™ uses industry-standard tools for configuration, communication, and control. For example,

the Evolution OS™ uses a Command Line Interface (CLI) whose syntax is very similar to that used by data center equipment such as routers and hubs.

SNMP Management

The EDS supports full SNMP management, making it ideal for applications where device management and monitoring are critical. These features allow networks with SNMP capabilities to correctly diagnose and monitor the EDS.

XML-Based Architecture and Device Control

XML is a fundamental building block for the future growth of M2M networks. The EDS supports XML-based configuration setup records that make device configuration transparent to users and administrators. The XML is easily editable with a standard text or XML editor.

Really Simple Syndication (RSS)

The EDS supports Really Simple Syndication (RSS), a rapidly emerging technology for streaming and managing on-line content. RSS feeds all the configuration changes that occur on the device. An RSS aggregator then reads (polls) the feed. More powerful than simple email alerts, RSS uses XML as an underlying Web page transport and adds intelligence to the networked device, while not taxing already overloaded email systems.

Enterprise-Grade Security

Evolution OS™ provides the EDS with the highest level of networking security possible. This 'data center grade' protection ensures that each device on the M2M network carries the same level of security as traditional IT networking equipment in the corporate data center.

By protecting the privacy of serial data transmitted across public networks, users can maintain their existing investment in serial technology, while taking advantage of the highest data-protection levels possible.

SSH and SSL can

- Verify the data received came from the proper source.
- Validate that the data transferred from the source over the network has not changed when it arrives at its destination (shared secret and hashing).
- Encrypt data to protect it from prying eyes and nefarious individuals.
- Provide the ability to run popular M2M protocols over a secure SSH or SSL connection.

In addition to keeping data safe and accessible, the EDS has robust defenses to hostile Internet attacks such as denial of service (DoS), which can be used to take down the network. Moreover, the EDS cannot be used to bring down other devices on the network.

You can use the EDS with the Lantronix Secure Com Port Redirector (SCPR) to encrypt COM port-based communications between PCs and virtually any electronic

device. SCPR is a Windows application that creates a secure communications path over a network between the computer and serial-based devices that are traditionally controlled via a COM port. With SCPR installed at each computer, computers that were formerly “hard-wired” by serial cabling for security purposes or to accommodate applications that only understood serial data can instead communicate over an Ethernet network or the Internet.

Terminal Server/Device Management

Remote offices can have routers, PBXs, servers and other networking equipment that require remote management from the corporate facility. The EDS easily attaches to the serial ports on a server, Private Branch Exchange (PBX), or other networking equipment to deliver central, remote monitoring and management capability.

With the menu system on the EDS, connections to the console ports of the attached devices as well as Ethernet hosts, such as Unix servers or another EDS, can easily be picked from a user-defined menu. This allows console ports across multiple devices to be accessed from one EDS.

Troubleshooting Capabilities

The EDS offers a comprehensive diagnostic toolset that lets you troubleshoot problems quickly and easily. Available from the Web Manager, CLI, and XML interfaces, the diagnostic tools let you

- View critical hardware, memory, MIB-II, buffer pool, and IP socket information.
- Perform ping and trace route operations.
- Conduct forward or backup DNS lookup operations.
- View all processes currently running on the EDS, including CPU utilization and total stack space available.

Configuration Methods

After installation, the EDS requires configuration. For the unit to operate correctly, it must have a unique IP address on the network. There are three basic methods for logging into the EDS and assigning IP addresses and other configurable settings:

DeviceInstaller: Configure the IP address and related settings and view current settings on the EDS using a Graphical User Interface (GUI) on a PC attached to a network. (See 6: Using DeviceInstaller on page 38.)

Web Manager: Through a web browser, configure the EDS settings using the Lantronix Web Manager. (See 7: Configuration Using Web Manager on page 41.)

Command Mode: There are two methods for accessing Command Mode (CLI): making a Telnet connection or connecting a terminal (or a PC running a terminal emulation program) to the unit serial port. (See the EDS Command Reference Guide for instructions and available commands.)

XML: The EDS supports XML-based configuration and setup records that make device configuration transparent to users and administrators. XML is easily editable with a standard text or XML editor. (See the EDS Command Reference Guide for instructions and commands.)

Addresses and Port Numbers

Hardware Address

The hardware address is also referred to as the Ethernet address or MAC address. The first three bytes of the Ethernet address are fixed and read 00-20-4A, identifying the unit as a Lantronix product. The fourth, fifth, and sixth bytes are unique numbers assigned to each unit.

Figure 2-4. Sample Hardware Address

00-20-4A-14-01-18

or

00:20:4A:14:01:18

IP Address

Every device connected to an IP network must have a unique IP address. This address references the specific unit.

Port Numbers

Every TCP connection and every UDP datagram is defined by a destination and source IP address, and a destination and source port number. For example, a Telnet server commonly uses port number 23.

The default server port numbers running on the EDS include

- TCP Port 22: SSH Server (Command Mode configuration).
- TCP Port 23: Telnet Server (Command Mode configuration).
- TCP Port 80: HTTP (Web Manager configuration).
- TCP Port 443: HTTPS (Web Manager configuration).
- UDP Port 161: SNMP.
- TCP Port 21: FTP.
- UDP Port 69: TFTP.
- UDP Port 514: Syslog.
- TCP Port 515: LPD.
- UDP Port 30718: LDP (Lantronix Discovery Protocol) port.
- TCP/UDP Port 10001: Tunnel 1.
- TCP/UDP Port 10002: Tunnel 2.

Product Information Label

The product information label on the bottom of the device contains the following information:

- Bar code
- Product ID (name)
- Product Revision
- Part number
- Hardware Address (MAC Address)

3: Installation of EDS8PS and EDS16PS

This chapter describes how to install the EDS8PS and EDS16PS device servers.

Package Contents

Your EDS package includes the following items:

- One EDS device server (EDS8PS or EDS16PS)
- One RJ45-to-DB9F serial cable
- One product CD that includes this User Guide, the Command Reference, and the Quick Start guide.
- A printed Quick Start guide

Your package may also include a power supply.

User-Supplied Items

To complete your EDS8/16PS installation, you need the following items:

- RS-232 serial devices that require network connectivity. Each EDS8/16/32PR serial port supports a directly connected RS-232 serial device.
- A serial cable for each serial device to be connected to the EDS8/16/32PR. All devices attached to the device ports support the RS-232C (EIA-232) standard. Category 5 cabling with RJ45 connections is used for the device port connections.

Note: *To connect an EDS8/16PS serial port to a DTE device, you need a DTE cable, such as the one supplied in your EDS8/16PS package, or an RJ45 patch cable and DTE adapter. To connect the EDS8/16PS serial port to a DCE device, you need a DCE (modem) cable, or an RJ45 patch cable and DTE adapter. For a list of the Lantronix cables and adapters you can use with the EDS8/16PS, see Appendix C: Lantronix Cables and Adapters.*

- An available connection to your Ethernet network and an Ethernet cable.
- A working power outlet if the unit will be powered from an AC outlet.

Identifying Hardware Components

Figure 3-1 shows the front of the EDS8PS.

Figure 3-2 shows the back of the EDS8PS.

Figure 3-1. Front View of the EDS8PS

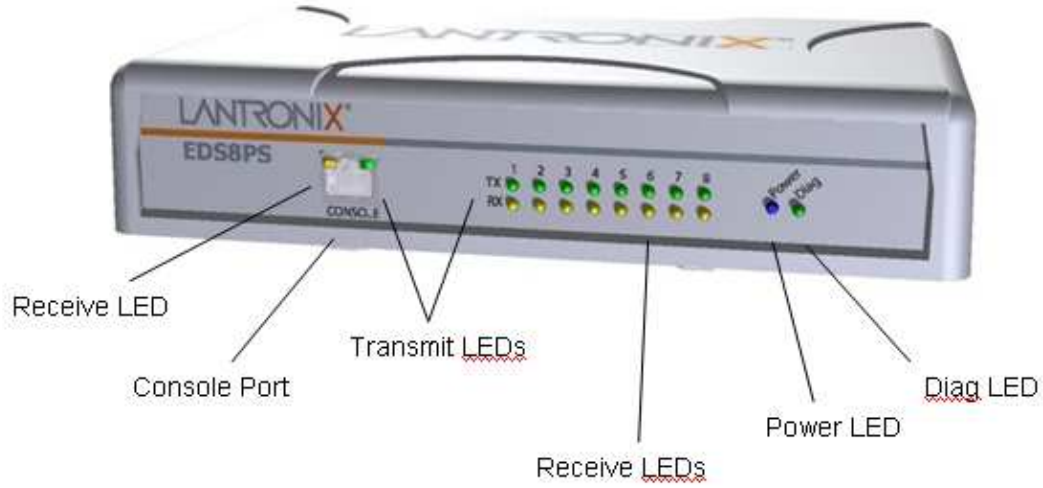
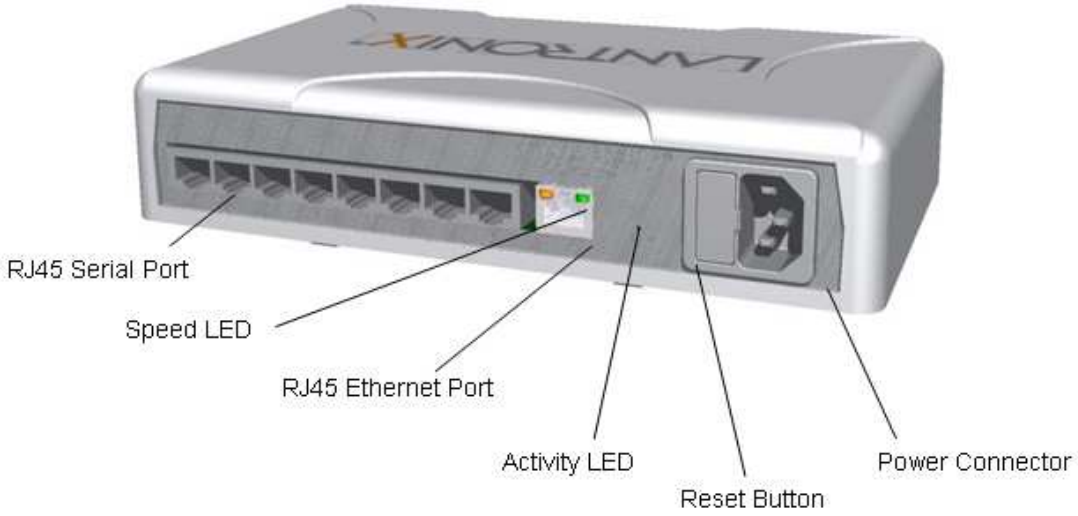


Figure 3-2. Back View of the EDS8PS



The product information label on the bottom contains the following information:

- Bar code
- Serial number
- Product ID (name)
- Product description
- Hardware address (also referred to as Ethernet or MAC address)
- Agency certifications

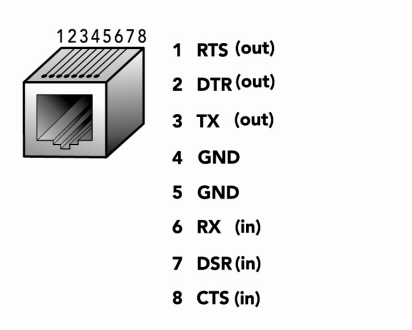
Serial Ports

The EDS8PS has 8 serial ports and the EDS16PS has 16 serial ports on the back panel. All are configured as DTE and support up to 230,400 baud.

Console Port

The front panel of the EDS8/16/32PR provides an RJ45 Console port. It is an extra serial port configured as DTE and supports baud rates up to 230,400 baud.

Figure 3-3. RJ45 Serial Port



Ethernet Port

The back panel of the EDS8/16PS provides a network interface via the rightmost RJ45 port. This port can connect to an Ethernet (10 Mbps) or Fast Ethernet (100 Mbps) network. The Speed LED on the back of the EDS8/16PS shows the connection of the attached Ethernet network. The EDS8/16PS can be configured to operate at a fixed Ethernet speed and duplex mode (half- or full-duplex) or to auto-negotiate the connection to the Ethernet network.

LEDs

Light-emitting diodes (LEDs) on the front panel show status information.

- Each serial port plus the console port have a Transmit and a Receive LED. The Ethernet port has Speed, Activity, Power, and Status LEDs.
- The table below describes the LEDs on the front of the EDSPS.

Front Panel LEDs

LED	Description
Transmit (green)	Blinking = EDS is transmitting data on the serial port.
Receive (yellow)	Blinking = EDS is receiving data on the serial port.
Power (blue)	On = EDS is receiving power.
Diag (green)	Fast blink = initial startup (loading OS). Slow blink (once per second) = operating system startup. On = unit has finished booting.

LED	Description
Speed (yellow)	On = EDS is connected to a 100 Mbps Fast Ethernet network.
	Off = EDS is connected to a 10 Mbps Ethernet network.
Activity (green)	Blink = EDS is sending data to or receiving data from the Ethernet network.

Reset Button

The reset button is on the rear of the device to the right of the Ethernet port, accessible through a hole in the case. You can use it to reboot the unit or to reload factory defaults.

Reboot the device:

1. Press and hold the reset button for about 3 seconds. The status LED blinks quickly.
2. When the fast blinks stop, release the button. When the unit reboots, the status LED changes from a fast blink to a solid ON.

Restore factory defaults:

1. Press and hold the reset button for about 11 seconds. The LED blinks quickly for about 3 seconds, then comes on for about 5 seconds, then blinks slowly for about 2 seconds.
2. When the slow blinks stop, release the button.

Installing the EDS8/16PS

Finding a Suitable Location

- You can install the EDS8/16PS either in a shelf or as a desktop unit.
- If using AC power, avoid outlets controlled by a wall switch.

Connecting the EDS8/16PS

All EDS serial ports support RS-232 devices.

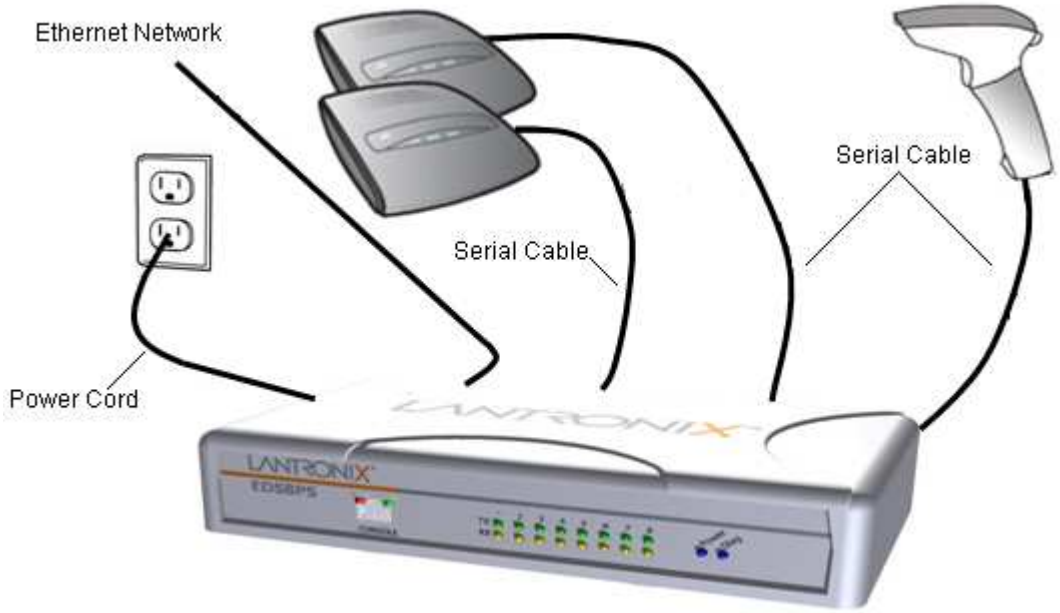
Connect the EDS8/16PS to one or more serial devices.

1. Power off the serial devices.
2. Attach a CAT 5 serial cable between the EDS8/16PS and your serial device. See Appendix C: Lantronix Cables and Adapters, for a list of cables and adapters you can use.
3. Connect an Ethernet cable between the EDS8/16PS Ethernet port and your Ethernet network.

4. Insert the power cord into the back of the EDS8/16PS. Plug the other end into an AC wall outlet.

5. Power up the serial devices.

Figure 3-4. Example of EDS8/16PS Connections



4: Installation of EDS4100

This chapter describes how to install the EDS4100 device server. See EDS4100 Overview on page 14 for connection and protocol specifications.

Package Contents

Your EDS4100 package includes the following items:

- One EDS4100 device server.
- One DB9F-to-DB9Fnull modem cable.
- A CD that includes this User Guide, the Command Reference Guide, and the Quick Start Guide.
- A printed Quick Start Guide.

Your package may also include a power supply.

User-Supplied Items

To complete your EDS4100 installation, you need the following items:

- RS-232 and/or RS-422/485 serial devices that require network connectivity:
- A serial cable for each serial device. One end of the cable must have a female DB9 connector for the EDS4100 serial port.
- To connect an EDS4100 serial port to another DTE device, you will need a null modem cable, such as the one supplied in your EDS4100 package.
- To connect the EDS4100 serial port to a DCE device, you will need a straight-through (modem) cable.
- An available connection to your Ethernet network and an Ethernet cable.
- A working power outlet if the unit will be powered from an AC outlet.

Identifying Hardware Components

The following two figures show the front and back of the EDS4100.

Figure 4-1. Front View of the EDS4100

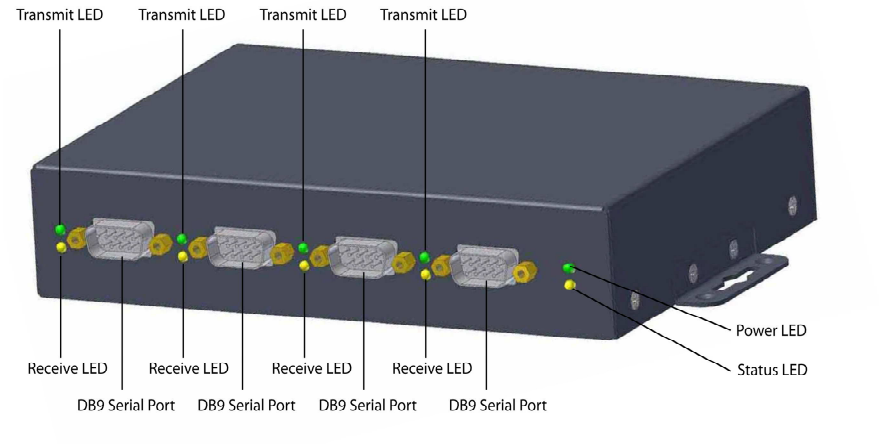
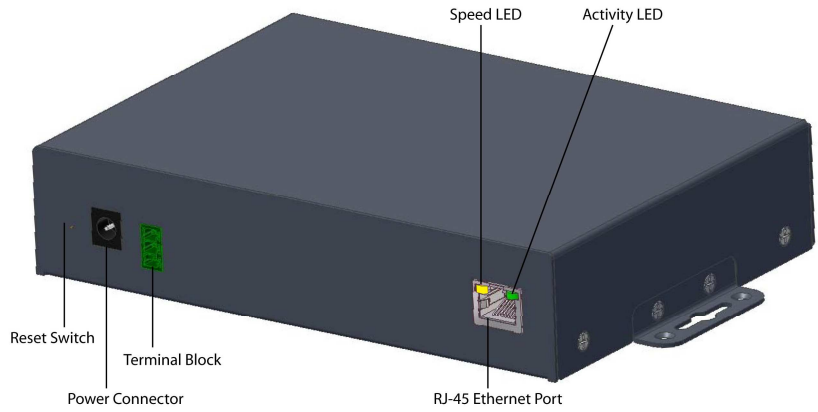


Figure 4-2. Back View of the EDS4100



The bottom of the EDS4100 (not shown) has a product information label. This label contains the following information:

- Bar code
- Serial number
- Product ID (name)
- Product description
- Hardware address (also referred to as Ethernet or MAC address)
- Agency certifications

Serial Ports

The front of the EDS4100 has four male DB9 serial ports. These ports allow you to connect up to four standard serial devices:

- All four serial ports support RS-232 devices. See Figure 4-3 for pin assignments.
- Serial ports 1 and 3 also support RS-422 and RS-485 serial devices. See Figure 4-4 for pin assignments.
- All four serial ports are configured as DTE.
- Ports 1 & 3 support up to 921600
- Ports 2 & 4 support up to 230400

Figure 4-3. RS-232 Serial Port Pins (Serial Ports 1, 2, 3, 4)

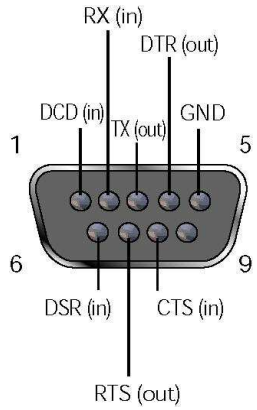
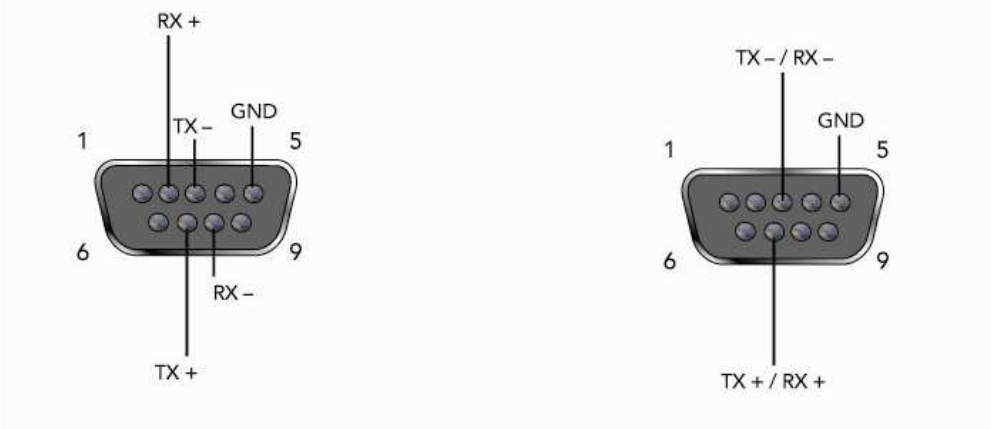


Figure 4-4. RS-422/RS-485 Serial Port Pins



RS-422/485 4-wire Pin Assignments (Serial Ports 1 and 3)

RS-485 2-wire Pin Assignments (Serial Ports 1 and 3)

Note: *Multi-drop connections are supported in 2-wire mode only.*

Ethernet Port

The back panel of the EDS4100 provides an RJ45 Ethernet port. This port can connect to an Ethernet (10 Mbps) or Fast Ethernet (100 Mbps) network. The Speed

LED on the back of the EDS4100 shows the connection of the attached Ethernet network. The EDS4100 can be configured to operate at a fixed Ethernet speed and duplex mode (half- or full-duplex) or auto-negotiate the connection to the Ethernet network.

Terminal Block Connector

The back of the EDS4100 has a socket for a terminal block screw connector (not included) for attaching to an appropriate power source, such as those used in automation and manufacturing industries. The terminal block connector supports a power range from 42 VDC to 56 VDC. It can be used with the EDS4100's barrel power connector and PoE capabilities as a redundant power source to the unit. Vendors who do supply this connector can be found by doing a web search for part 'Phoenix 1803581 MC 1,5/ 3-ST-3,81'.

Figure 4-5. Terminal Block Connector Pin Assignments

Pin	Signal
Top	V+
Middle	V-
Bottom	Ground

LEDs

Light-emitting diodes (LEDs) on the front and back panels show status information.

- **Back panel**. Each serial port has a Transmit and a Receive LED. The Ethernet connector has Speed and Activity LEDs. In addition, the back panel has a Power LED and a Status LED.
- **Front panel**. The front panel has a green Power LED.
- The table below describes the LEDs on the back of the EDS4100.

Figure 4-6. Back Panel LEDs

LED	Description
Transmit (green)	Blinking = EDS is transmitting data on the serial port.
Receive (yellow)	Blinking = EDS is receiving data on the serial port.
Power (green)	On = EDS is receiving power.
Status (yellow)	Fast blink = initial startup (loading OS). Slow blink (once per second) = operating system startup. On = unit has finished booting.
Speed (yellow)	On = EDS is connected to a 100 Mbps Fast Ethernet network.
	Off = EDS is connected to a 10 Mbps Ethernet network.
Activity	Blink = EDS is sending data to or receiving data from the Ethernet

LED	Description
(green)	network.

Reset Button

The reset button is on the back of the EDS4100, to the left of the power connector. Pressing this button reboots the EDS4100 and terminates all data activity occurring on the serial and Ethernet ports.

Physically Installing the EDS4100

Finding a Suitable Location

- Place the EDS4100 on a flat horizontal or vertical surface. The EDS4100 comes with mounting brackets installed for vertically mounting the unit, for example, on a wall.
- If using AC power, avoid outlets controlled by a wall switch.

Connecting the EDS4100

Observe the following guidelines when attaching serial devices:

- All four EDS4100 serial ports support RS-232 devices.
- Alternatively, ports 1 and 3 support RS-422/485 devices.
- To connect an EDS4100 serial port to another DTE device, use a null modem cable.
- To connect the EDS4100 serial port to a DCE device, use a straight-through (modem) cable.

Connect the EDS4100 to one or more serial devices.

1. Power off the serial devices.
2. Attach a serial cable between the EDS4100 and each serial device.
3. Connect an Ethernet cable between the EDS4100 Ethernet port and your Ethernet network.
4. Power-up the EDS4100. Use one or more of the following methods.

These power-up methods can be used in combination to provide redundant backup power to the unit.

- **PoE**: Power is supplied over the Ethernet cable by an Ethernet switch or a mid-span device.

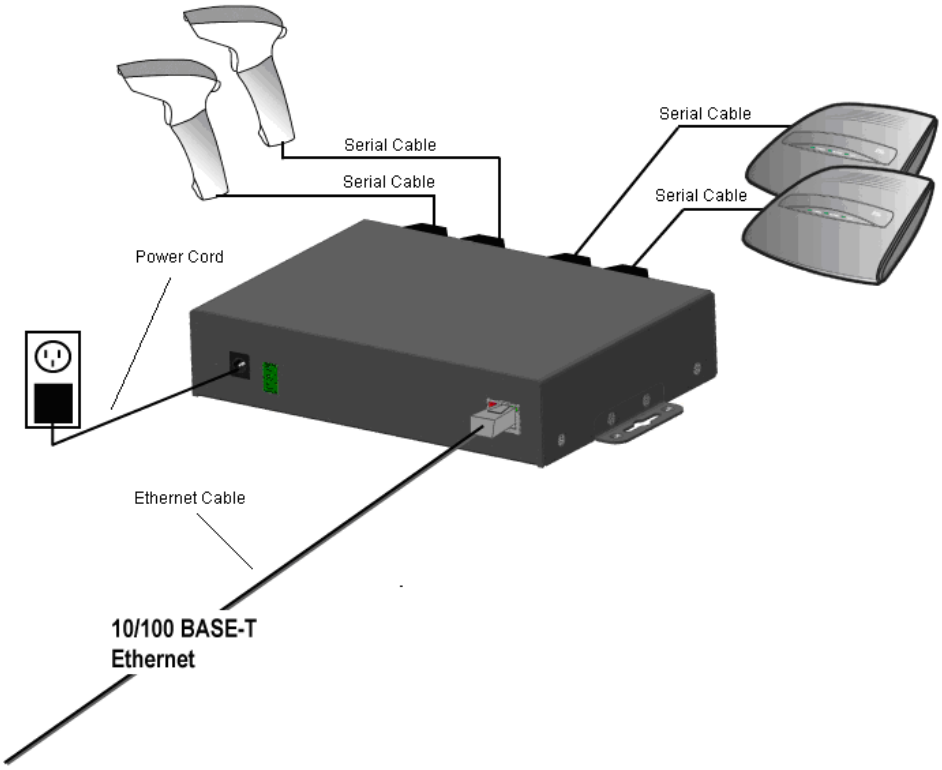
- **Barrel power connector:** The barrel power connector supports a power range of 9 to 30 VDC. Insert the round end of the supplied power cord into the barrel power connector on the back of the EDS4100. Plug the other end into an AC wall outlet.

- **Terminal block connector**: The terminal block connector supports a power range of 42 VDC to 56 VDC. Attach the power source to the terminal block connector on the back of the EDS4100.

As soon as you plug it in, the EDS4100 powers up automatically, the self-test begins, and Evolution OS™ starts.

5. Power up the serial devices.

Figure 4-7. Example of EDS4100 Connections



5: Installation of EDS8PR, EDS16PR, or EDS32PR

This chapter describes installing the EDS8PR, EDS16PR and EDS32PR device servers. See EDS8PR, EDS16PR, and EDS32PR Overview on page 16, for overview information.

Package Contents

Your EDS package includes the following items:

- One EDS device server (EDS8PR, EDS16PR or EDS32PR).
- One RJ45-to-DB9F serial cable.
- A CD that includes this User Guide, the Command Reference Guide, and the Quick Start Guide.
- A printed Quick Start guide.
- Your package may also include a power supply.

User-Supplied Items

To complete your EDS8/16/32PR installation, you need the following items:

- RS-232 serial devices that require network connectivity. Each EDS8/16/32PR serial port supports a directly connected RS-232 serial device.
- A serial cable for each serial device. All devices attached to the EDS device ports must support the RS-232C (EIA-232) standard. Category 5 cabling with RJ45 connections is used for the device port connections.

Note: *To connect an EDS8/16/32PR serial port to a DTE device, you need a DTE cable, such as the one supplied in your EDS8/16/32PR package, or an RJ45 patch cable and DTE adapter. To connect the EDS8/16/32PR serial port to a DCE device, you need a DCE (modem) cable, or an RJ45 patch cable and DTE adapter.*

For a list of the Lantronix cables and adapters you can use with the EDS8/16/32PR, see Appendix C: Lantronix Cables and Adapters.

- An available connection to your Ethernet network and an Ethernet cable.
- A working power outlet if the unit will be powered from an AC outlet.

Identifying Hardware Components

The following two figures show the components on the front and back of the EDS16PR.

Figure 5-1. Front View of the EDS16PR

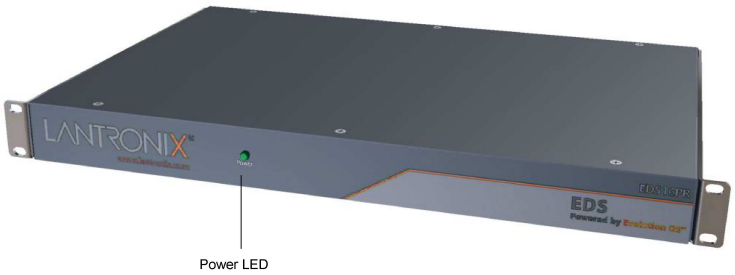
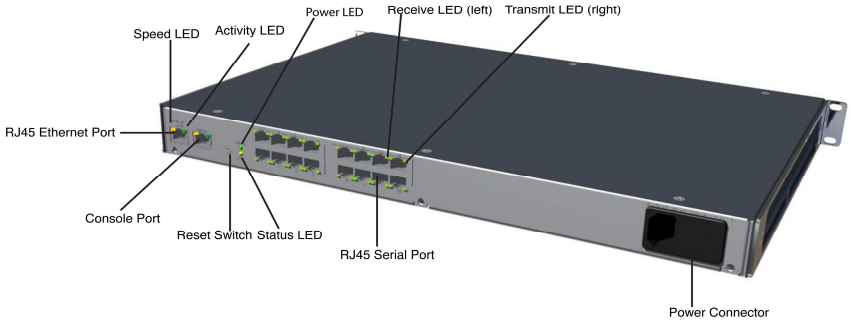


Figure 5-2. Back View of the EDS16PR



Product Label

A product information label on the bottom contains the following information:

- Bar code
- Serial number
- Product ID (name)
- Product description
- Hardware address (also referred to as Ethernet or MAC address)
- Agency certifications

Serial Ports

All EDS serial ports are configured as DTE and support up to 230,400 baud.

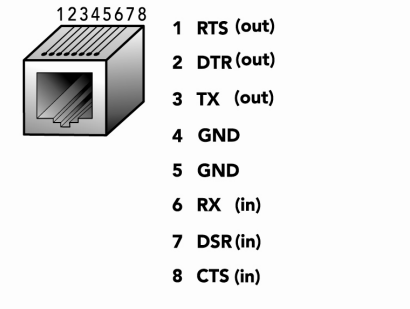
- The EDS8PR has 8 serial ports.

- The EDS16PR has 16 serial ports.
- The EDS32PR has 32 serial ports.

Console Port

The front panel has an RJ45 Console port. It is an extra serial port configured as DTE and supports up to 230,400 baud.

Figure 5-3. RJ45 Serial Port



Ethernet Port

The back panel has an RJ45 Ethernet port. This port can connect to an Ethernet (10 Mbps) or Fast Ethernet (100 Mbps) network.

The Speed LED on the back panel shows the connection speed of the connected Ethernet network.

You can configure the EDS to operate at a fixed Ethernet speed and duplex mode (half- or full-duplex) or auto-negotiate the connection to the Ethernet network.

LEDs

Light-emitting diodes (LEDs) on the front and back panels show status information.

- **Front panel**. The front panel has a green Power LED.
- **Back panel**. Each serial port has a Transmit and a Receive LED. The Ethernet connector has Speed and Activity LEDs. There is also a Power LED and a Status LED.

The table below describes the LEDs on the back of the EDS.

Back Panel LEDs

LED	Description
Transmit (green)	Blinking = EDS is transmitting data on the serial port.
Receive (yellow)	Blinking = EDS is receiving data on the serial port.
Power (green)	On = EDS is receiving power.

LED	Description
Status (yellow)	Fast blink = initial startup (loading OS). Slow blink (once per second) = operating system startup. On = unit has finished booting.
Speed (yellow)	On = EDS is connected to a 100 Mbps Fast Ethernet network.
	Off = EDS is connected to a 10 Mbps Ethernet network.
Activity (green)	Blink = EDS is sending data to or receiving data from the Ethernet network.

Reset Button

The reset button is on the back of the EDS, to the left of the power connector.

Pressing this button for 2-to-3 seconds reboots the EDS8/16/32PR and terminates all data activity occurring on the serial and Ethernet ports.

Installing the EDS8/16/32PR

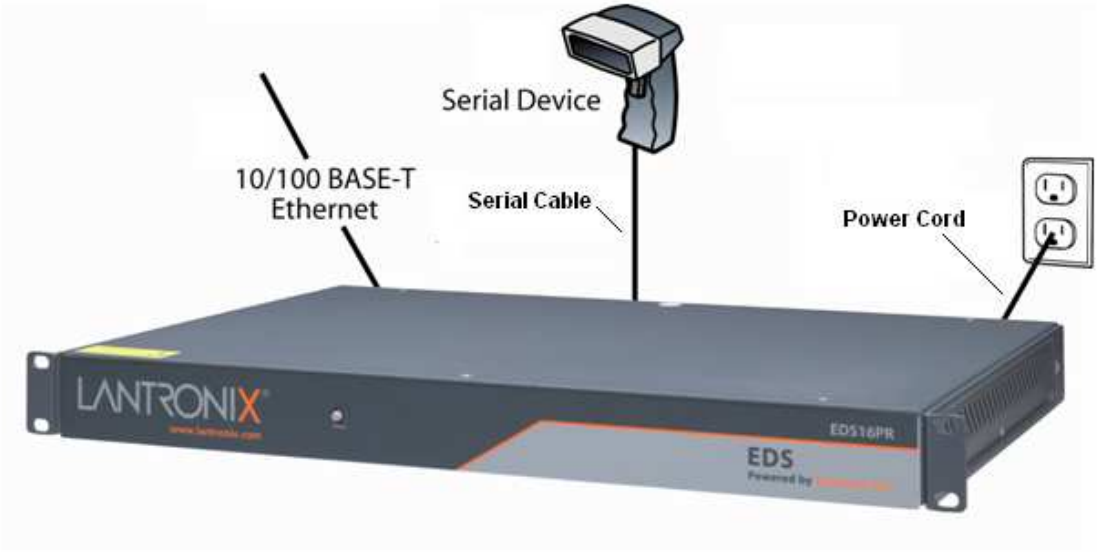
Finding a Suitable Location

You can install the EDS8/16/32PR either in an EIA-standard 19-inch rack (1U tall) or as a desktop unit. If using AC power, avoid outlets controlled by a wall switch.

Connecting the EDS8/16/32PR

1. Power off the serial devices that will be connected to the EDS8/16/32PR.
2. Attach a CAT 5 serial cable between the EDS8/16/32PR and your serial device. For a list of cables and adapters you can use with the EDS8/16/32PR, see Appendix C: Lantronix Cables and Adapters.
3. Connect an Ethernet cable between the EDS8/16/32PR Ethernet port and your Ethernet network.
4. Insert the power cord into the back of the EDS8/16/32PR. Plug the other end into an AC wall outlet. After power-up, the self-test begins.
5. Power up the serial devices.

Figure 5-4. Example of EDS16PR Connections



6: Using DeviceInstaller

This chapter covers the steps for locating an EDS unit and viewing its properties and device details.

For instructions on using DeviceInstaller to configure the IP address and related settings or for more advanced features, see the Device Installer online Help.

Accessing an EDS using DeviceInstaller

Note: *Write down the MAC address from the product label. You will need it to locate the EDS using DeviceInstaller.*

Follow the instructions on the product CD to install and run DeviceInstaller.

1. Click **Start→All Programs→Lantronix→DeviceInstaller→DeviceInstaller**.

2. When DeviceInstaller starts, it will perform a network device search. To perform another search, click the "Search" button.

3. Expand the EDS folder by clicking the **+** symbol next to the EDS folder icon. The list of available Lantronix EDS devices appears.

4. Select the EDS unit by expanding its entry and clicking on its hardware (MAC) address to view its configuration.

5. On the right page, click the **Device Details** tab. The current EDS configuration appears. This is only a subset of the full configuration; the full configuration may be accessed via Web Manager, CLI, or XML.

Device Details Summary

Note: *The settings in this table are Display Only unless otherwise noted.*

Current Settings	Description
Name	Name identifying the EDS.
Group	Configurable field. Enter a group to categorize the EDS. Double-click the field, type in the value, and press Enter to complete. This group name is local to this PC and is not visible on other PCs or laptops using DeviceInstaller.
Comments	Configurable field. Enter comments for the EDS. Double-click the field, type in the value, and press Enter to complete. This description or comment is local to this PC and is not visible on other PCs or laptops using DeviceInstaller.
Device Family	Shows the EDS device family type as “EDS”.
Type	Shows the device type as “EDS”.
ID	Shows the EDS ID embedded within the unit.
Hardware Address	Shows the EDS hardware (MAC) address.
Firmware Version	Shows the firmware currently installed on the EDS.
Extended Firmware Version	Provides additional information on the firmware version.
Online Status	Shows the EDS status as Online, Offline, Unreachable (the EDS is on a different subnet), or Busy (the EDS is currently performing a task).
IP Address	Shows the EDS current IP address. To change the IP address, click the Assign IP button on the DeviceInstaller menu bar.
IP Address was Obtained	Appears “Dynamically” if the EDS automatically received an IP address (e.g., from DHCP). Appears “Statically” if the IP address was configured manually. If the IP address was assigned dynamically, the following fields appear: Obtain via DHCP with values of True or False. Obtain via BOOTP with values of True or False.
Subnet Mask	Shows the subnet mask specifying the network segment on which the EDS resides.

Current Settings	Description
Gateway	Shows the IP address of the router of this network. There is no default.
Number of Ports	Shows the number of serial ports on this MarchPort AR.
Supports Configurable Pins	Shows False, indicating configurable pins are available on the EDS.
Supports Email Triggers	Shows True, indicating email triggers are available on the EDS.
Telnet Enabled	Indicates whether Telnet is enabled on this EDS.
Telnet Port	Shows the EDS port for Telnet sessions.
Web Enabled	Indicates whether Web Manager access is enabled on this EDS.
Web Port	Shows the EDS port for Web Manager configuration.
Maximum Baud Rate Supported	Shows the EDS maximum baud rate.
Firmware Upgradeable	Shows True, indicating the EDS firmware is upgradeable as newer versions become available.

7: Configuration Using Web Manager

This chapter describes how to configure the EDS using Web Manager, the Lantronix browser-based configuration tool.

The unit configuration is stored in nonvolatile memory and is retained without power.

All changes take effect immediately, unless otherwise noted.

Accessing Web Manager through a Web Browser

Access the Web Manager:

One Step Select the Web Configuration tab on the DeviceInstaller window.

—Or—

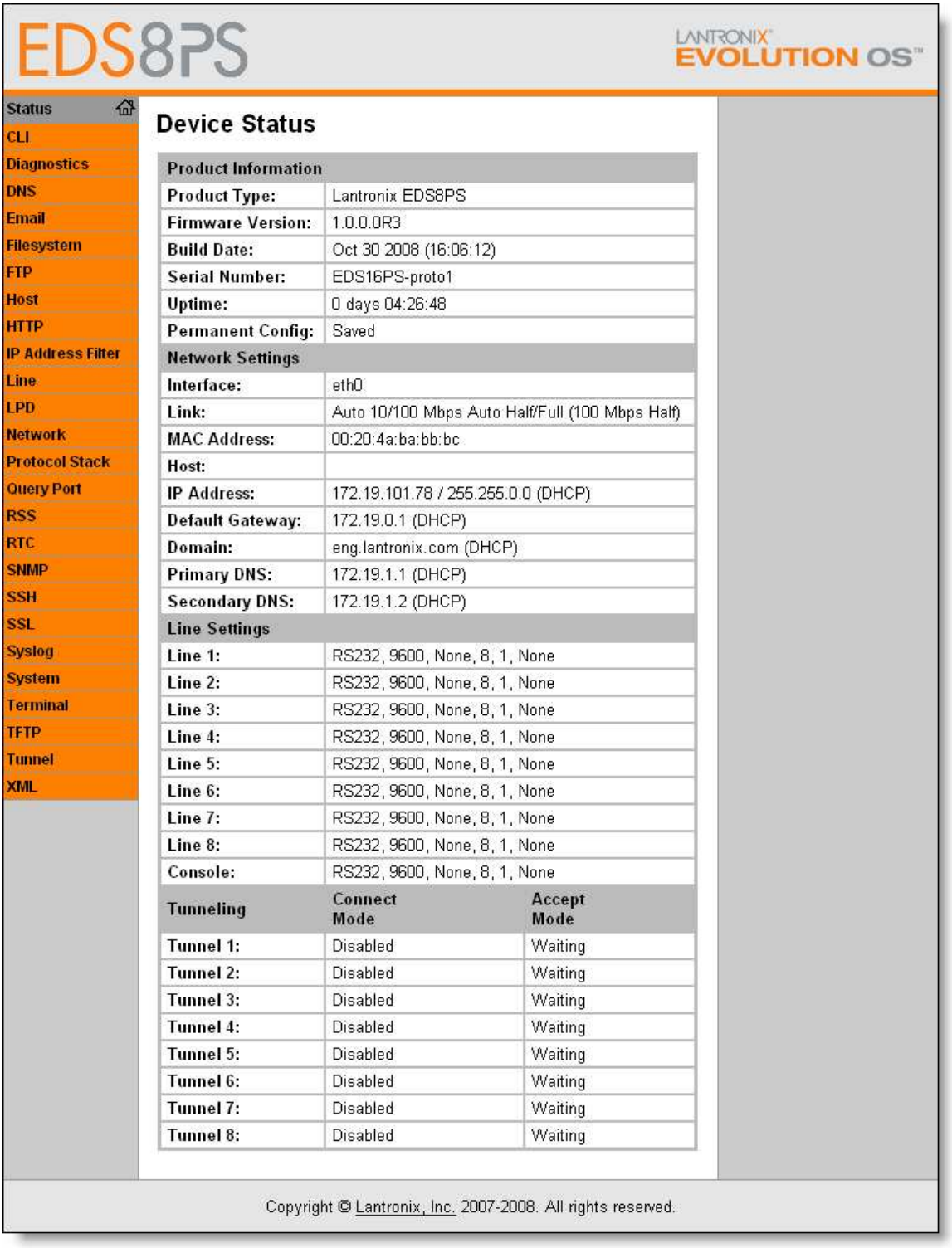
1. Open a standard web browser (such as Netscape Navigator 6.x and above, Internet Explorer 5.5. and above, Mozilla Suite, Mozilla Firefox, Opera, Safari, or Chrome).

2. Enter the IP address of the EDS.

3. Enter your user name and password.
   The factory-default user name and password are “admin” and “PASS”.

4. The Web Manager home page (the Device Status page) appears. It shows the EDS configuration and product information.

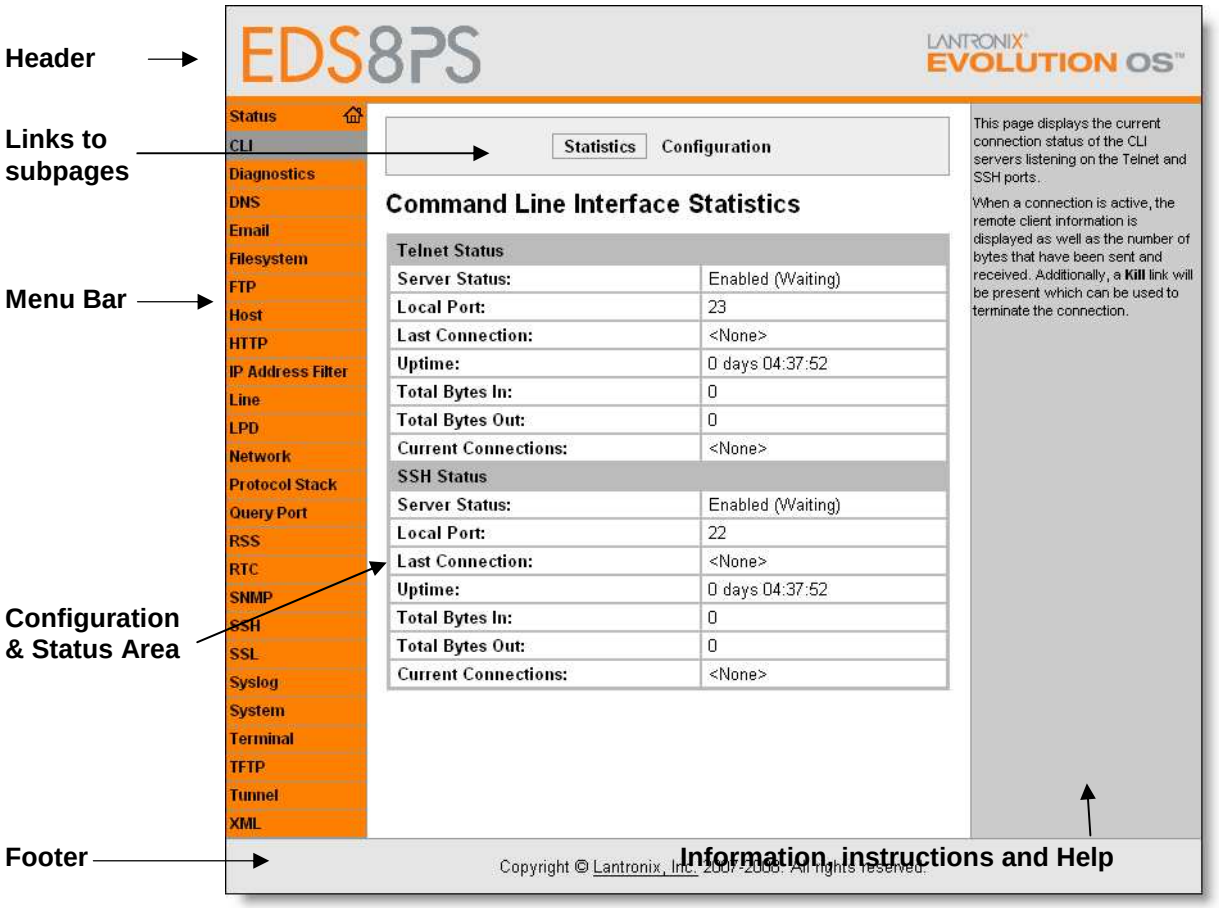
Figure 7-1. The EDS Web Manager Status Home Page



Web Manager Page Components

Use Figure 7-2 to orient yourself to the areas of the EDS Web Manager page.

Figure 7-2. Components of the Web Manager Page



The **Orange Menu Bar** always appears at the left of the page. It lists the names of the pages available in the Web Manager. To bring up a page, click it in the menu bar.

The white area of the page has from one to three sections:

- At the **top**, many pages, such as the one in the example above, enable you to link to sub pages. On some pages, you must also select the item you are configuring, such as a line or a tunnel.
- In the **middle section**, you can select or enter new configuration settings. After you change settings, click **Submit** to apply the changes. Some settings require a reboot of the EDS before the settings take effect. Those settings are identified in the appropriate sections in this chapter.
- The **bottom section** usually shows the current configuration. In some cases, you can reset or clear a configuration setting.
- The **Instructions, Information, and Help** area shows information or instructions associated with the page.

- The **Footer** appears at the bottom of the page. It contains copyright information and a link to the Lantronix home page.

Navigating the Web Manager

The Web Manager provides an intuitive point-and-click interface.

A menu bar at the left side of each page provides links you can click to navigate from one page to another.

Some pages are read-only, while others let you change configuration settings.

Summary of Web Manager Pages

Web Menu Link	Description	See Page
Status	Shows product information and network, line, and tunneling settings.	46
CLI	Shows Command Line Interface (CLI) statistics and lets you change the current CLI configuration settings.	124
Diagnostics	Lets you perform various diagnostic procedures.	110
DNS	Shows the current configuration of the DNS subsystem and the DNS cache.	78
Email	Shows email statistics and lets you clear the email log, configure email settings, and send an email.	121
Filesystem	Shows file system statistics and lets you browse the file system to view a file, create a file or directory, upload files using HTTP, copy a file, move a file, or perform TFTP actions.	103
FTP	Shows statistics and lets you change the current configuration for the File Transfer Protocol (FTP) server.	80
Host	Lets you view and change settings for a host on the network.	75
HTTP	Shows HyperText Transfer Protocol (HTTP) statistics and lets you change the current configuration and authentication settings.	83
IP Address Filter	Lets you specify all the IP addresses and subnets that are allowed to send data to this device.	109
Line	Shows statistics and lets you change the current configuration and Command mode settings of a serial line.	52
LPD	Shows LPD (Line Printer Daemon) Queue statistics and lets you configure the LPD and print a test page.	90
Network	Shows status and lets you configure the network interface.	47
Protocol Stack	Lets you perform lower level network stack-specific activities.	106
Query Port	Lets you change configuration settings for the query port.	110
RSS	Lets you change current Really Simple Syndication	89

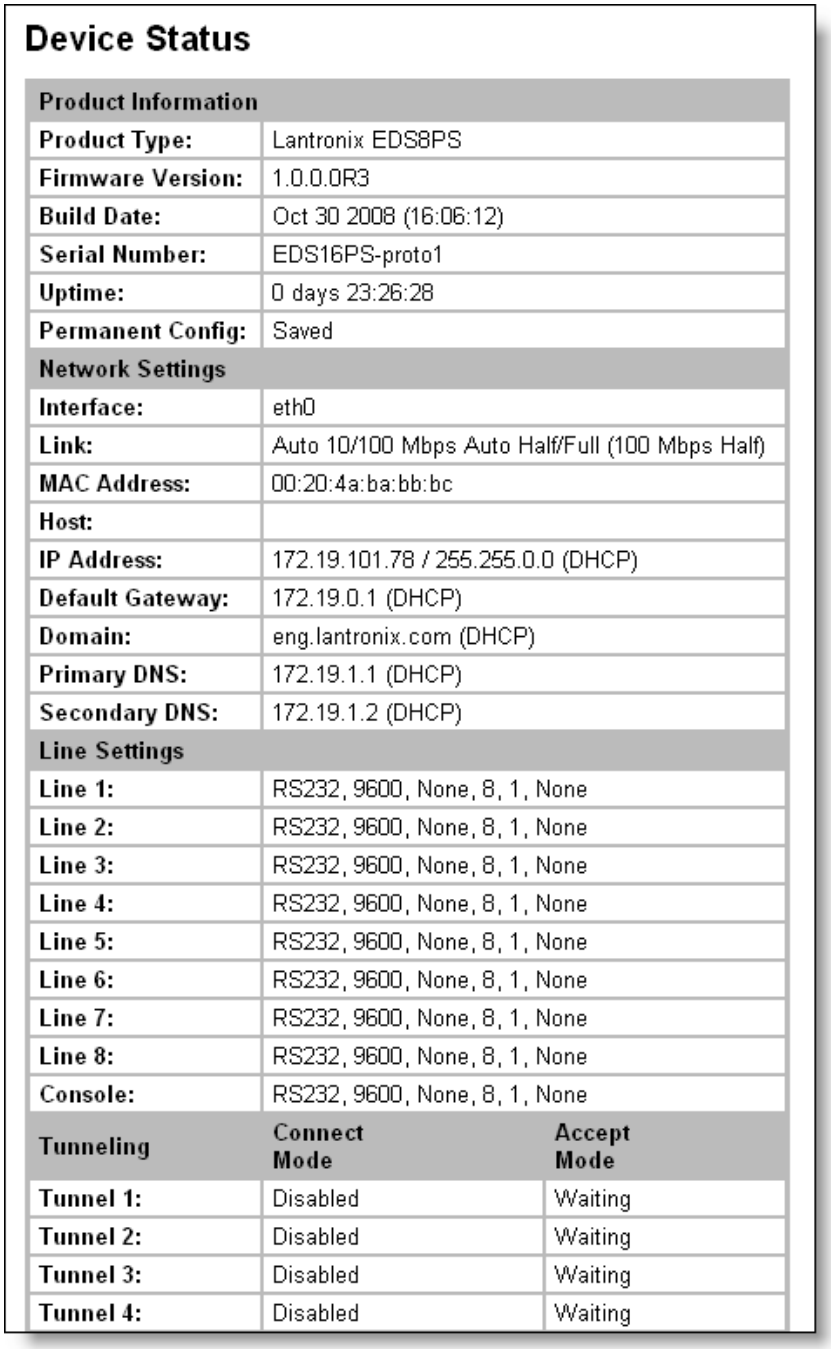
Web Menu Link	Description	See Page
	(RSS) settings.	
SNMP	Lets you change the current Simple Network Management Protocol (SNMP) configuration settings.	78
SSH	Lets you change the configuration settings for SSH server host keys, SSH server authorized users, SSH client known hosts, and SSH client users.	93
SSL	Lets you upload an existing certificate or create a new self-signed certificate.	99
Syslog	Lets you specify the severity of events to log and the server and ports to which the syslog should be sent.	82
System	Lets you reboot the EDS, restore factory defaults, upload new firmware, and change the EDS long and short names.	120
Terminal	Lets you change current settings for a terminal.	72
TFTP	Shows statistics and lets you change the current configuration for the Trivial File Transfer Protocol (TFTP) server.	81
Tunnel Settings	Lets you change the configuration settings for a tunnel.	57
XML	Lets you export XML configuration and status records, and import XML configuration records.	126

Device Status Page

The Device Status page is the first page that appears when you log into the Web Manager. It also appears when you click the Status link in the menu bar.

This read-only page shows EDS product information, network settings, line settings, and tunneling settings.

Figure 7-3. Device Status



Device Status

Product Information		
Product Type:	Lantronix EDS8PS	
Firmware Version:	1.0.0.0R3	
Build Date:	Oct 30 2008 (16:06:12)	
Serial Number:	EDS16PS-proto1	
Uptime:	0 days 23:26:28	
Permanent Config:	Saved	
Network Settings		
Interface:	eth0	
Link:	Auto 10/100 Mbps Auto Half/Full (100 Mbps Half)	
MAC Address:	00:20:4a:ba:bb:bc	
Host:		
IP Address:	172.19.101.78 / 255.255.0.0 (DHCP)	
Default Gateway:	172.19.0.1 (DHCP)	
Domain:	eng.lantronix.com (DHCP)	
Primary DNS:	172.19.1.1 (DHCP)	
Secondary DNS:	172.19.1.2 (DHCP)	
Line Settings		
Line 1:	RS232, 9600, None, 8, 1, None	
Line 2:	RS232, 9600, None, 8, 1, None	
Line 3:	RS232, 9600, None, 8, 1, None	
Line 4:	RS232, 9600, None, 8, 1, None	
Line 5:	RS232, 9600, None, 8, 1, None	
Line 6:	RS232, 9600, None, 8, 1, None	
Line 7:	RS232, 9600, None, 8, 1, None	
Line 8:	RS232, 9600, None, 8, 1, None	
Console:	RS232, 9600, None, 8, 1, None	
Tunneling	**Connect Mode**	**Accept Mode**
Tunnel 1:	Disabled	Waiting
Tunnel 2:	Disabled	Waiting
Tunnel 3:	Disabled	Waiting
Tunnel 4:	Disabled	Waiting

8: Network Settings

The Network Settings pages show the status of the Ethernet link and let you configure it on the EDS device.

Network Settings

Network 1 (eth0) Interface Status

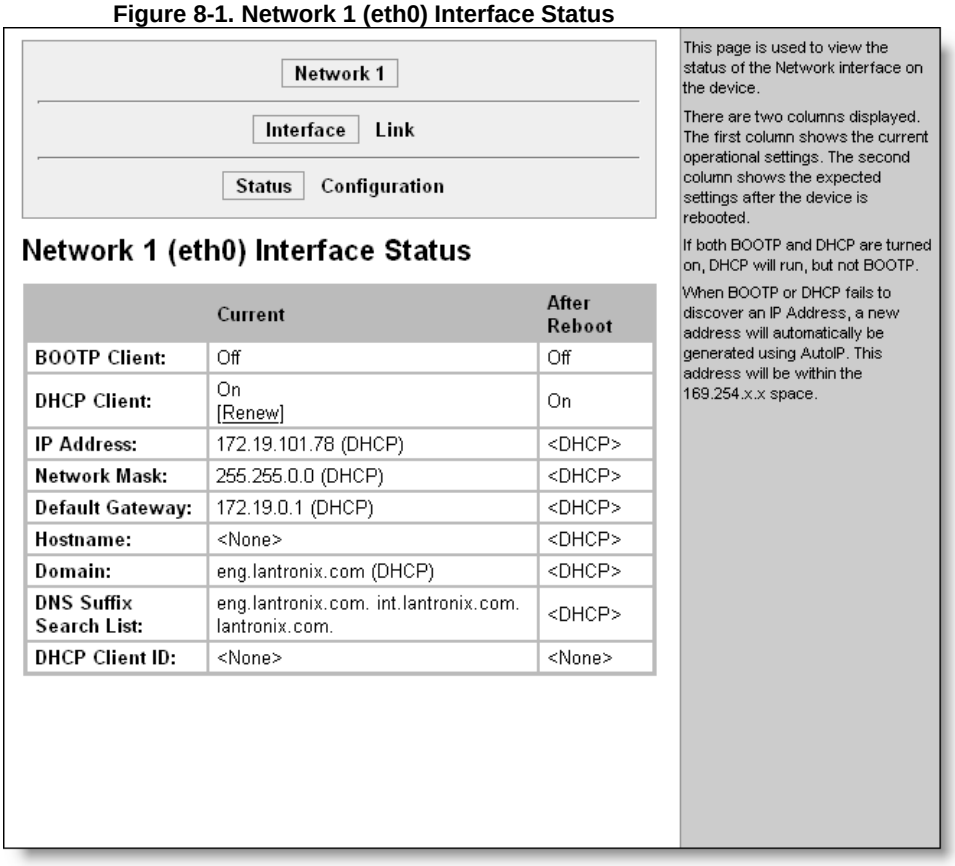
This page shows the status of the Ethernet network interface.

View the network interface status:

1. Click **Network**.

2. Click **Network 1**, **Interface**, and **Status**. (Default)
   The Network 1 (eth0) Interface Status page appears.

Figure 8-1. Network 1 (eth0) Interface Status


Network 1
Interface
Link
Status
Configuration
Network 1 (eth0) Interface Status
Current
After Reboot
BOOTP Client:
Off
Off
DHCP Client:
On
[Renew]
On
IP Address:
172.19.101.78 (DHCP)
<DHCP>
Network Mask:
255.255.0.0 (DHCP)
<DHCP>
Default Gateway:
172.19.0.1 (DHCP)
<DHCP>
Hostname:
<None>
<DHCP>
Domain:
eng.lantronix.com (DHCP)
<DHCP>
DNS Suffix Search List:
eng.lantronix.com. int.lantronix.com. lantronix.com.
<DHCP>
DHCP Client ID:
<None>
<None>
This page is used to view the status of the Network interface on the device.
There are two columns displayed. The first column shows the current operational settings. The second column shows the expected settings after the device is rebooted.
If both BOOTP and DHCP are turned on, DHCP will run, but not BOOTP.
When BOOTP or DHCP fails to discover an IP Address, a new address will automatically be generated using AutoIP. This address will be within the 169.254.x.x space.

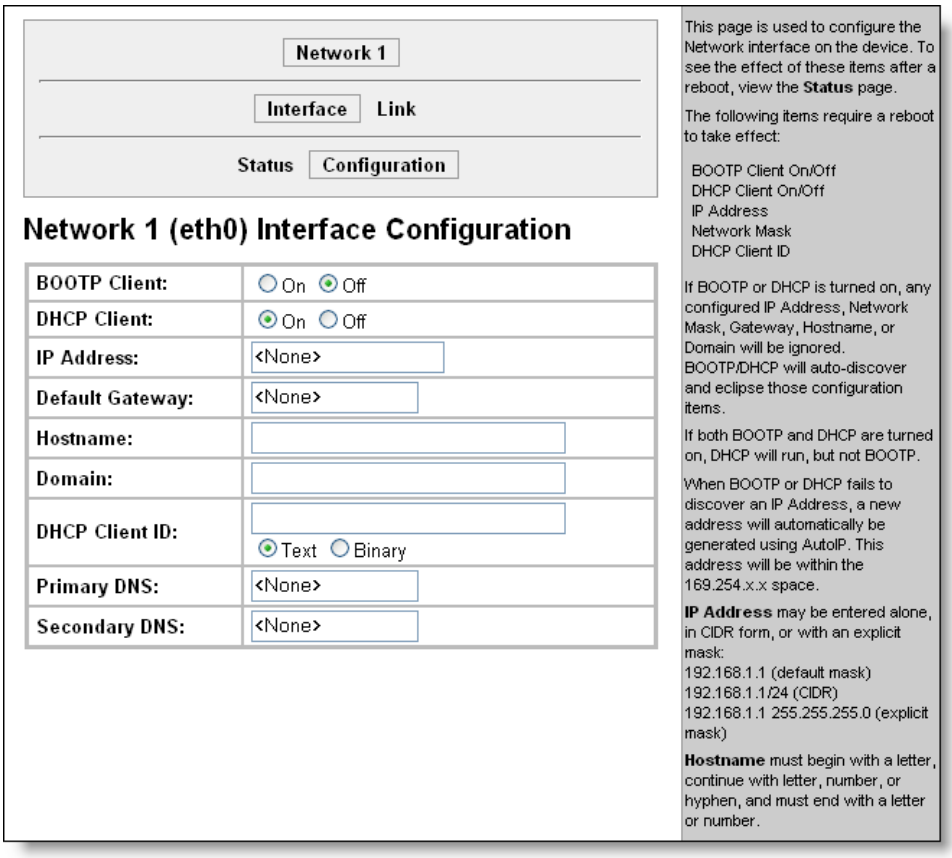
Network 1 (eth0) Interface Configuration

This page shows the configuration settings for the Ethernet connection and lets you change these settings.

View and configure network interface settings:

1. Click **Network 1, Interface, and Configuration**.
   The Network 1 (eth0) Interface Configuration page appears.

Figure 8-2. Network 1 (eth0) Interface Configuration


Network 1
Interface
Link
Status
Configuration
Network 1 (eth0) Interface Configuration
BOOTP Client:
On
Off
DHCP Client:
On
Off
IP Address:
<None>
Default Gateway:
<None>
Hostname:
Domain:
DHCP Client ID:
Text
Binary
Primary DNS:
<None>
Secondary DNS:
<None>
This page is used to configure the Network interface on the device. To see the effect of these items after a reboot, view the Status page.
The following items require a reboot to take effect:
BOOTP Client On/Off
DHCP Client On/Off
IP Address
Network Mask
DHCP Client ID
If BOOTP or DHCP is turned on, any configured IP Address, Network Mask, Gateway, Hostname, or Domain will be ignored. BOOTP/DHCP will auto-discover and eclipse those configuration items.
If both BOOTP and DHCP are turned on, DHCP will run, but not BOOTP.
When BOOTP or DHCP fails to discover an IP Address, a new address will automatically be generated using AutoIP. This address will be within the 169.254.x.x space.
IP Address may be entered alone, in CIDR form, or with an explicit mask:
192.168.1.1 (default mask)
192.168.1.1/24 (CIDR)
192.168.1.1 255.255.255.0 (explicit mask)
Hostname must begin with a letter, continue with letter, number, or hyphen, and must end with a letter or number.

2. Enter or modify the following settings:

Network 1 Interface Configuration Page Settings	Description
BOOTP Client	Select **On** or **Off**. At boot up the EDS will attempt to obtain an IP address from a BOOTP server. ***Notes:*** *Overrides the configured IP address, network mask, gateway, hostname, and domain.* *When DHCP is **On**, the system automatically uses DHCP, regardless of whether BOOTP Client is **On.***

Network 1 Interface Configuration Page Settings	Description
DHCP Client	Select **On** or **Off**. At boot up the EDS will attempt to lease an IP address from a DHCP server and maintain the lease at regular intervals. ***Note:*** *Overrides BOOTP, the configured IP address, network mask, gateway, hostname, and domain.*
IP Address	Enter the EDS static IP address. You may enter it alone, in CIDR format, or with an explicit mask. The IP address consists of four octets separated by a period and is used if BOOTP and DHCP are both set to **Off**. Changing this value requires you to reboot the EDS. ***Note:*** *When DHCP is enabled, the EDS tries to obtain an IP address from DHCP. If it cannot, the EDS uses an Auto IP address in the range of 169.254.xxx.xxx.*
Default Gateway	Enter the IP address of the router for this network. Or, clear the field (appears as **<None>**). This address is only used for static IP address configuration.
Hostname	Enter the EDS hostname. It must begin with a letter, continue with a sequence of letters, numbers, and/or hyphens, and end with a letter or number.
Domain	Enter the EDS's domain name.
DHCP Client ID	Enter the ID if the DHCP server uses a DHCP ID. The DHCP server's lease table shows IP addresses and MAC addresses for devices. The lease table shows the Client ID, in hexadecimal notation, instead of the EDS MAC address.
Primary DNS	IP address of the primary name server. This entry is required if you choose to configure DNS (Domain Name Server) servers.
Secondary DNS	IP address of the secondary name server.

3. Click **Submit.** Changes to the following settings require a reboot for the changes to take effect:

   - DHCP Client On/Off
   - BOOTP Client On/Off
   - IP address
   - Network mask
   - DHCP Client ID.

***Note**: If DHCP or BOOTP fails, AutoIP intervenes and assigns an address. In this case, the static IP (if configured) is ignored.*

Network 1 Ethernet Link

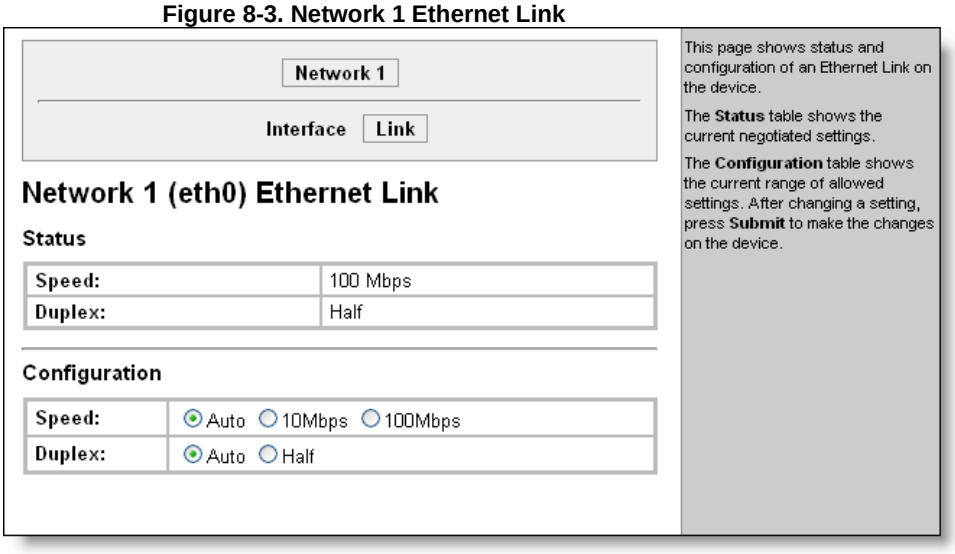
This page shows the current negotiated Ethernet settings and lets you change the speed and duplex settings.

View and configure the Ethernet link:

1. Click **Network** on the menu bar.

2. Then click **Network 1** and **Link** at the top of the page, as shown below. The Network 1 (eth0) Ethernet Link page appears.

Figure 8-3. Network 1 Ethernet Link



Status shows the current negotiated settings.

Configuration shows the current range of allowed settings.

3. Enter or modify the following settings:

Network 1-Ethernet Link Page Settings	Description
Ethernet Link Speed	Select the Ethernet link speed. (Default is **Auto**.)
Ethernet Link Duplex	Select duplex mode. (Default is **Auto**.)

4. Click **Submit.** The changes take effect immediately.

9: Line, Tunnel, Terminal, and Host Settings

Line Settings

The Line Settings pages display the status and statistics for each of the serial lines (ports). They also let you change the character format and Command Mode settings for the serial lines.

The following section describes the steps to view and configure Line settings.

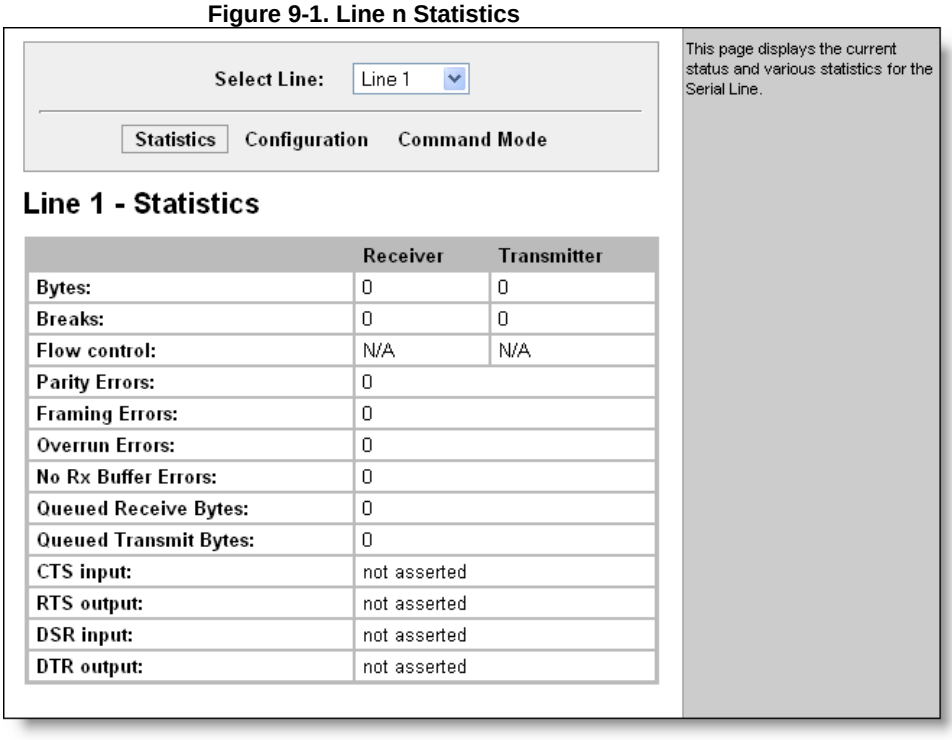
Line Statistics

This read-only page shows the status and statistics for the serial line selected at the top of this page.

One Step

Select **Line** on the menu bar and a Line number on the drop down list. The Line Statistics page for the selected serial line appears.

Figure 9-1. Line n Statistics



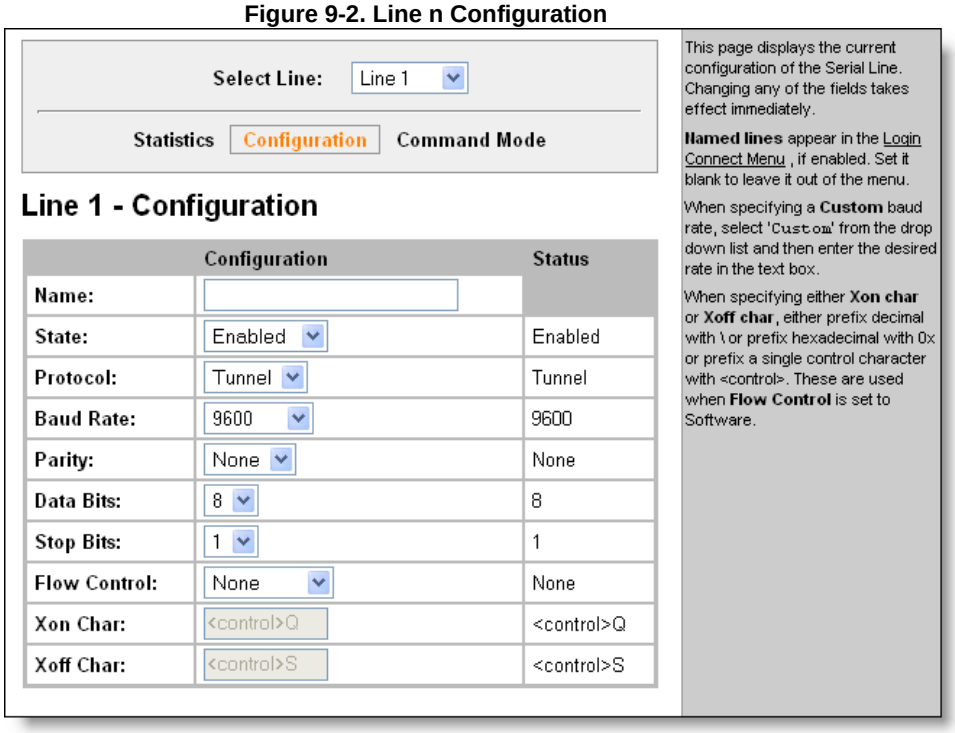
Line Configuration

This page shows the configuration settings for the serial line selected at the top of the page and lets you change the settings for that serial line.

Configure Line n:

1. Click **Line n** and **Configuration**. The Line n Configuration page appears.

Figure 9-2. Line n Configuration


Select Line: Line 1
Statistics Configuration Command Mode
Line 1 - Configuration
Configuration
Status
Name:
State: Enabled Enabled
Protocol: Tunnel Tunnel
Baud Rate: 9600 9600
Parity: None None
Data Bits: 8 8
Stop Bits: 1 1
Flow Control: None None
Xon Char: <control>Q <control>Q
Xoff Char: <control>S <control>S
This page displays the current configuration of the Serial Line. Changing any of the fields takes effect immediately.
Named lines appear in the Login Connect Menu , if enabled. Set it blank to leave it out of the menu.
When specifying a Custom baud rate, select 'Custom' from the drop down list and then enter the desired rate in the text box.
When specifying either Xon char or Xoff char, either prefix decimal with \ or prefix hexadecimal with 0x or prefix a single control character with <control>. These are used when Flow Control is set to Software.

2. Enter or modify the following settings:

Line - Configuration Page Settings	Description
Name	Enter a name for the line. The default Name is blank.
State	Indicates whether the current line is enabled. To change the state, select Enabled or Disabled from the drop-down menu.
Protocol	Select the protocol from the drop-down menu. The default is Tunnel.
Baud Rate	Select the baud rate from the drop-down menu. The default is 9600.
Parity	Select the parity from the drop-down menu. The default is None.
Data Bits	Select the number of data bits from the drop-down menu. The default is 8.
Stop Bits	Select the number of stop bits from the drop-down menu. The default is 1.
Flow Control	Select the flow control from the drop-down menu. The

Line - Configuration Page Settings	Description
	default is None.
Xon Char	Specify the character to use to start the flow of data when Flow Control is set to Software. Prefix a decimal character with \ or a hexadecimal character with 0x, or provide a single printable character. The default Xon char is 0x11.
Xoff Char	Specify the character to use to stop the flow of data when Flow Control is set to Software. Prefix a decimal character with \ or a hexadecimal character with 0x, or provide a single printable character. The default Xoff char is 0x13.

3. Click **Submit.**

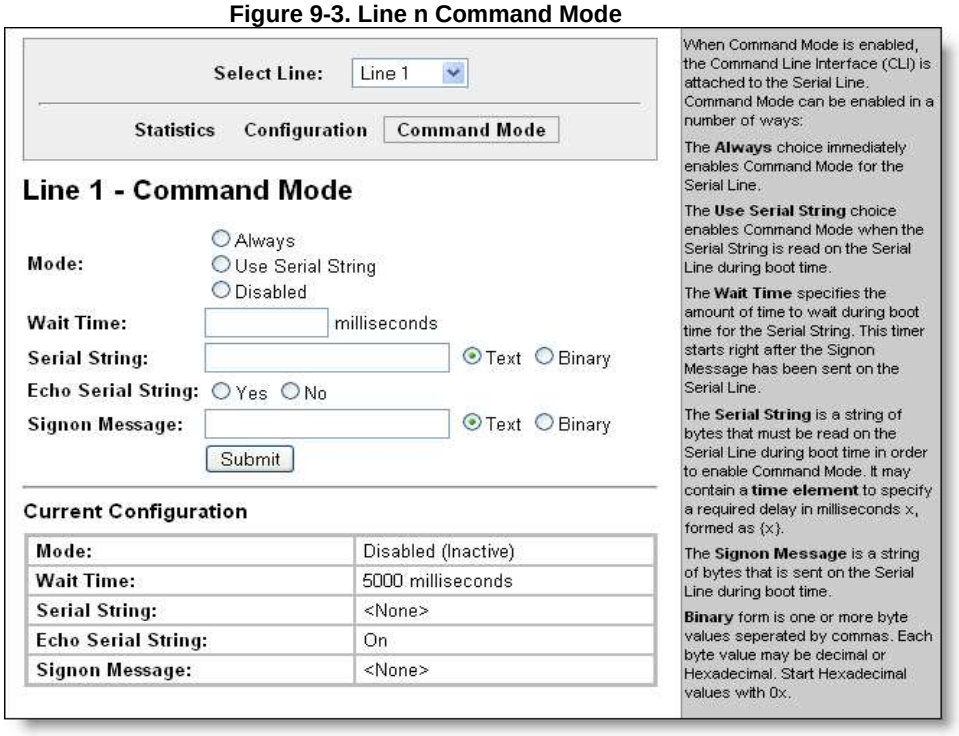
Line Command Mode

Setting Command Mode enables the command line interface (CLI) on the serial line.

Configure Line n Command Mode:

1. Click **Line n** and **Command Mode**. The Line n Command Mode page appears.

Figure 9-3. Line n Command Mode


Select Line: Line 1
Statistics Configuration Command Mode
Line 1 - Command Mode
Mode: Always Use Serial String Disabled
Wait Time: milliseconds
Serial String: Text Binary
Echo Serial String: Yes No
Signon Message: Text Binary
Submit
Current Configuration
Mode: Disabled (Inactive)
Wait Time: 5000 milliseconds
Serial String: <None>
Echo Serial String: On
Signon Message: <None>
When Command Mode is enabled, the Command Line Interface (CLI) is attached to the Serial Line. Command Mode can be enabled in a number of ways:
The Always choice immediately enables Command Mode for the Serial Line.
The Use Serial String choice enables Command Mode when the Serial String is read on the Serial Line during boot time.
The Wait Time specifies the amount of time to wait during boot time for the Serial String. This timer starts right after the Signon Message has been sent on the Serial Line.
The Serial String is a string of bytes that must be read on the Serial Line during boot time in order to enable Command Mode. It may contain a time element to specify a required delay in milliseconds x, formed as {x}.
The Signon Message is a string of bytes that is sent on the Serial Line during boot time.
Binary form is one or more byte values seperated by commas. Each byte value may be decimal or Hexadecimal. Start Hexadecimal values with 0x.

2. Enter or modify the following settings:

Line - Command Mode Page Settings	Description
Mode	Select the method of enabling Command Mode or choose to disable Command Mode. **Always** = immediately enables Command Mode for the serial line. **Use Serial String** = enables Command Mode when the serial string is read on the serial line during boot time. **Disabled** = turns off Command Mode.
Wait Time	Enter the wait time for the serial string during boot-up in milliseconds.
Serial String	Enter the serial string characters. Select a string type. Text = string of bytes that must be read on the Serial Line during boot time to enable Command Mode. It may contain a time element in x milliseconds, in the format {x}, to specify a

Line - Command Mode Page Settings	Description
	required delay. Binary = string of characters representing byte values where each hexadecimal byte value starts with \0x and each decimal byte value starts with \.
Echo Serial String	Select Yes to enable echoing of the serial string at boot-up.
Sign-on Message	Enter the boot-up sign-on message. Select a string type. **Text** = string of bytes sent on the serial line during boot time. **Binary** = one or more byte values separated by commas. Each byte value may be decimal or hexadecimal. Start hexadecimal values with 0x. ***Note:*** *This string will be output on the serial port at boot, regardless of whether command mode is enabled or not.*

3. In **Current Configuration**, clear currently stored settings as necessary.
4. Click **Submit.**

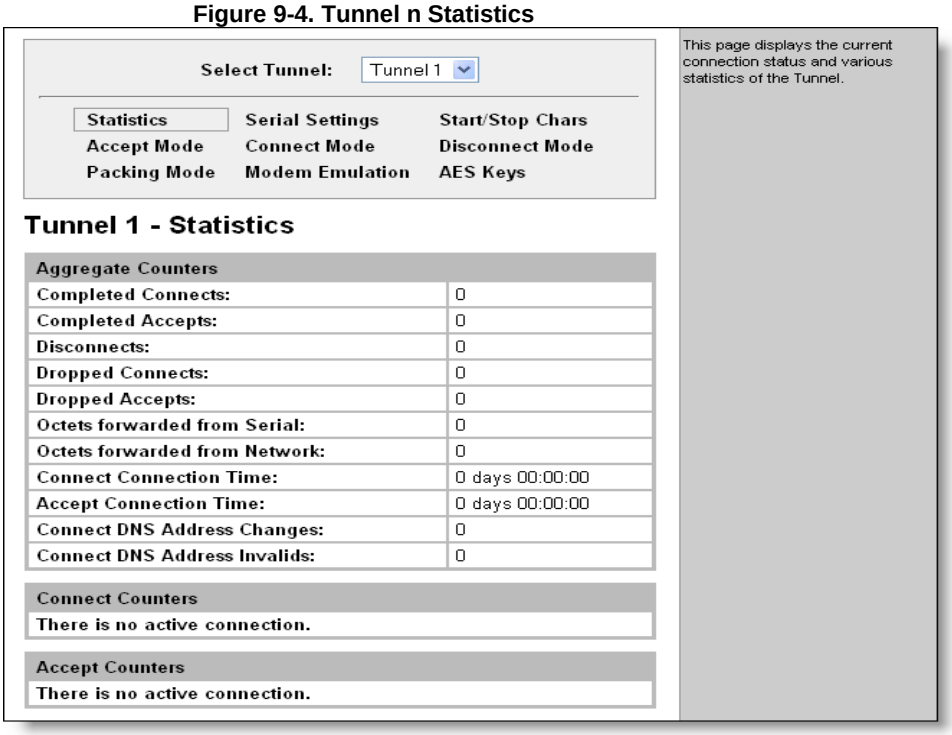
Tunnel Settings

The Tunnel pages allow you to view current statistics and configure serial settings, Connect Mode, Accept Mode, Disconnect Mode, Packing Mode, start and stop characters, modem emulation, and AES keys.

View Tunnel – Statistics

One Step Click **Tunnel** on the menu bar then pick a tunnel from the drop down list. The Tunnel Statistics page appears.

Figure 9-4. Tunnel n Statistics



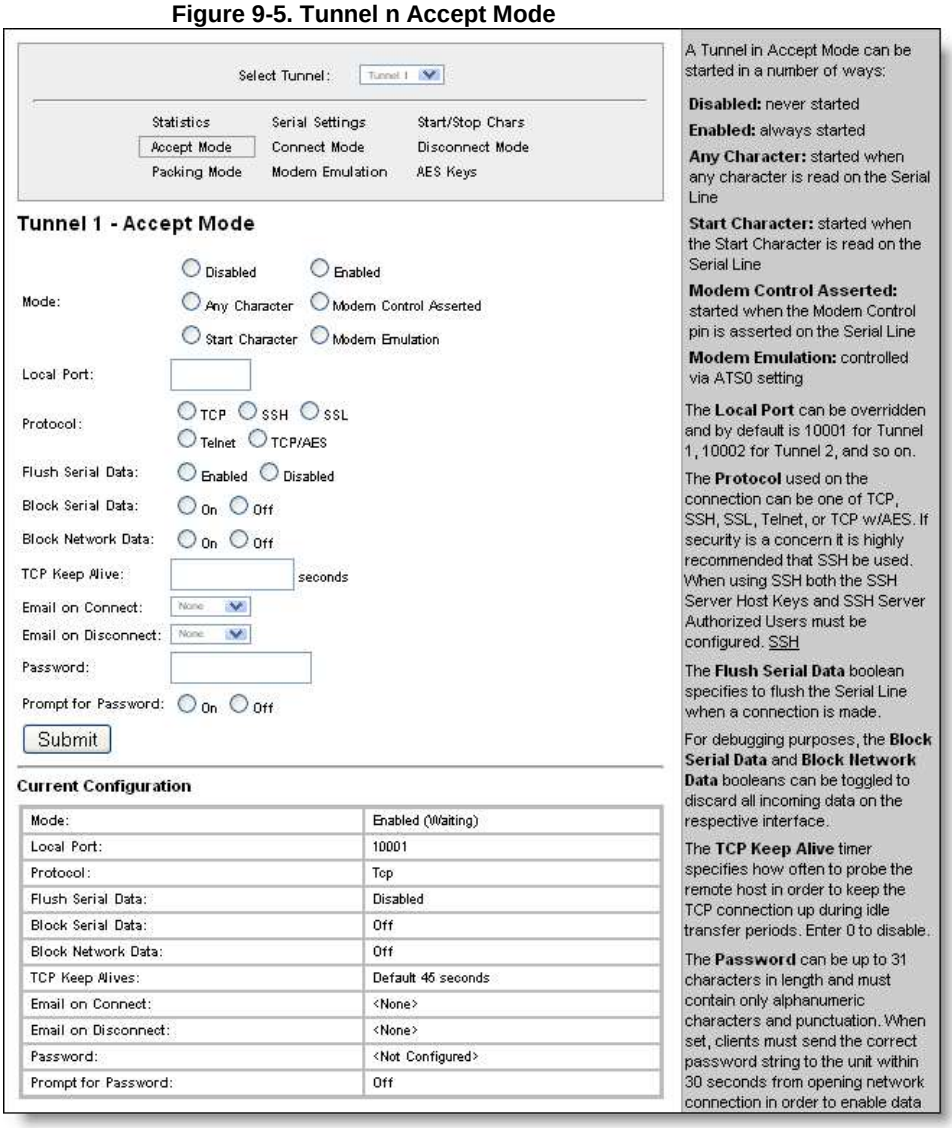
Accept Mode

In Accept Mode, the EDS listens (waits) for incoming connections.

Configure Accept Mode:

1. Click **Tunnel n** and **Accept Mode** at the top of the page. The Tunnel n Accept Mode page appears.

Figure 9-5. Tunnel n Accept Mode


Select Tunnel: Tunnel 1
Statistics
Serial Settings
Start/Stop Chars
Accept Mode
Connect Mode
Disconnect Mode
Packing Mode
Modem Emulation
AES Keys
Tunnel 1 - Accept Mode
Mode:
Disabled
Enabled
Any Character
Modem Control Asserted
Start Character
Modem Emulation
Local Port:
Protocol:
TCP
SSH
SSL
Telnet
TCP/AES
Flush Serial Data:
Enabled
Disabled
Block Serial Data:
On
Off
Block Network Data:
On
Off
TCP Keep Alive:
seconds
Email on Connect:
None
Email on Disconnect:
None
Password:
Prompt for Password:
On
Off
Submit
Current Configuration
Mode: Enabled (Waiting)
Local Port: 10001
Protocol: Tcp
Flush Serial Data: Disabled
Block Serial Data: Off
Block Network Data: Off
TCP Keep Alives: Default 45 seconds
Email on Connect: <None>
Email on Disconnect: <None>
Password: <Not Configured>
Prompt for Password: Off
A Tunnel in Accept Mode can be started in a number of ways:
Disabled: never started
Enabled: always started
Any Character: started when any character is read on the Serial Line
Start Character: started when the Start Character is read on the Serial Line
Modem Control Asserted: started when the Modem Control pin is asserted on the Serial Line
Modem Emulation: controlled via ATS0 setting
The Local Port can be overridden and by default is 10001 for Tunnel 1, 10002 for Tunnel 2, and so on.
The Protocol used on the connection can be one of TCP, SSH, SSL, Telnet, or TCP w/AES. If security is a concern it is highly recommended that SSH be used. When using SSH both the SSH Server Host Keys and SSH Server Authorized Users must be configured. SSH
The Flush Serial Data boolean specifies to flush the Serial Line when a connection is made.
For debugging purposes, the Block Serial Data and Block Network Data booleans can be toggled to discard all incoming data on the respective interface.
The TCP Keep Alive timer specifies how often to probe the remote host in order to keep the TCP connection up during idle transfer periods. Enter 0 to disable.
The Password can be up to 31 characters in length and must contain only alphanumeric characters and punctuation. When set, clients must send the correct password string to the unit within 30 seconds from opening network connection in order to enable data

2. Enter or modify the following settings:

Tunnel - Accept Mode Page Settings	Description
Mode	Select the method used to start a tunnel in Accept mode. Choices are: **Disabled** = do not accept an incoming connection. **Enabled** = accept an incoming connection. (*default*) **Any Character** = start waiting for an incoming connection when any character is read on the serial line. **Start Character** = start waiting for an incoming connection when the start character for the selected tunnel is read on the serial line. **Modem Control Asserted** = start waiting for an incoming connection as long as the Modem Control pin (DSR) is asserted on the serial line until a connection is made. **Modem Emulation** = start waiting for an incoming connection when triggered by modem emulation AT commands. Connect mode must also be set to Modem Emulation.
Local Port	Enter the port number for use as the local port. The defaults are port 10001 for Tunnel n and port 10002 for Tunnel 2.
Protocol	Select the protocol type for use with Accept Mode. The default protocol is TCP.
Flush Serial Data	Select Enabled to flush the serial data buffer on a new connection.
Block Serial Data	Select On to block, or not tunnel, serial data transmitted to the EDS.
Block Network Data	Select On to block, or not tunnel, network data transmitted to the EDS.
TCP Keep Alive	Enter the time, in seconds, the EDS waits during a silent connection before checking if the currently connected network device is still on the network. If the unit then gets no response after 8 attempts, it drops that connection.
Email on Connect	Select whether the EDS sends an email when a connection is made. Select None if you do not want to send an email. Otherwise, select the Email profile to use for sending.
Email on Disconnect	Select whether the EDS sends an email when a connection is closed. Select None if you do not want to send an email. Otherwise, select the Email profile to use for sending.
Password	Enter a password that clients must send to the EDS within 30 seconds from opening a network connection to enable data transmission. The password can have up to 31 characters and must contain

Tunnel - Accept Mode Page Settings	Description
	only alphanumeric characters and punctuation. When set, the password sent to the EDS must be terminated with one of the following: (a) 0x0A (LF), (b) 0x00, (c) 0x0D 0x0A (CR LF), or (d) 0x0D 0x00.
Prompt for Password	Indicate whether to prompt the user for the password upon connection. **On** = prompt for a password upon connection. **Off** = do not prompt for a password upon connection.

3. Click **Submit.**

Packing Mode

When in Packing Mode, data is not transferred one byte at a time. Instead, data is queued and sent in segments.

Configure the Tunnel Packing Mode:

1. Select **Tunnel n** and **Packing Mode** at the top of the page. The Tunnel n Packing Mode page appears. Depending on the **Mode** selection, different configurable parameters are shown.

   The following figures show the display for each of the three packing modes.

Figure 9-6a. Tunnel n Packing Mode (Mode = Disable)

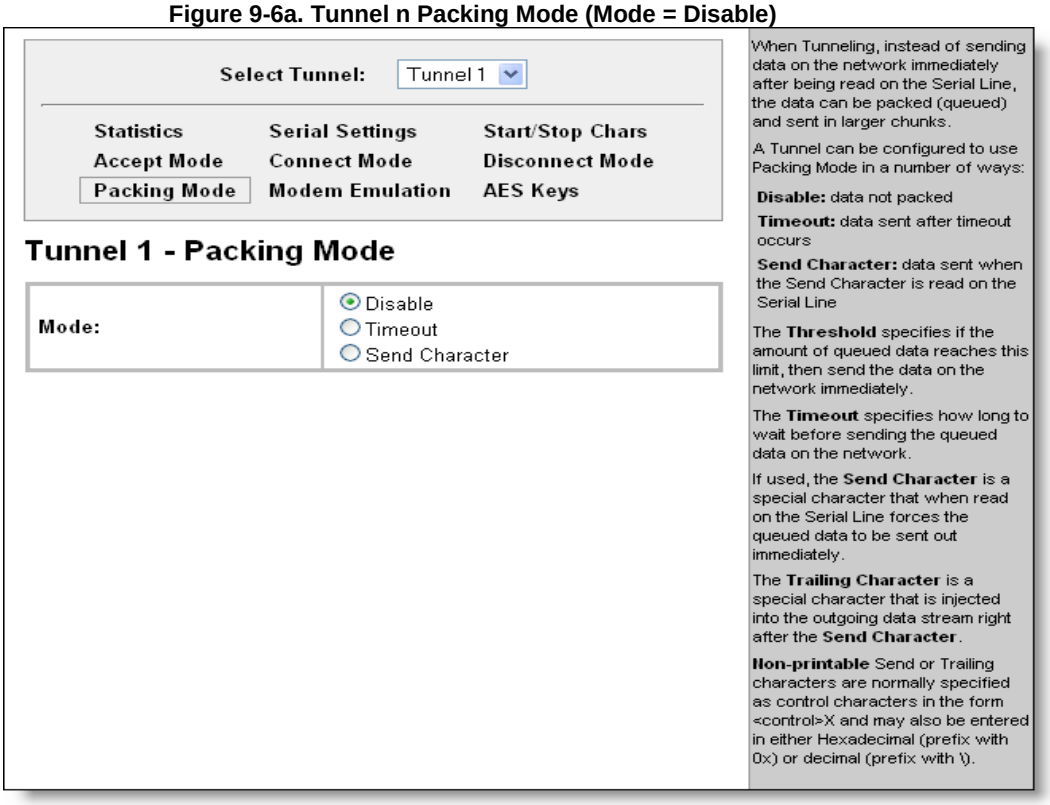

Select Tunnel: Tunnel 1
Statistics
Serial Settings
Start/Stop Chars
Accept Mode
Connect Mode
Disconnect Mode
Packing Mode
Modem Emulation
AES Keys
Tunnel 1 - Packing Mode
Mode:
Disable
Timeout
Send Character
When Tunneling, instead of sending data on the network immediately after being read on the Serial Line, the data can be packed (queued) and sent in larger chunks.
A Tunnel can be configured to use Packing Mode in a number of ways:
Disable: data not packed
Timeout: data sent after timeout occurs
Send Character: data sent when the Send Character is read on the Serial Line
The Threshold specifies if the amount of queued data reaches this limit, then send the data on the network immediately.
The Timeout specifies how long to wait before sending the queued data on the network.
If used, the Send Character is a special character that when read on the Serial Line forces the queued data to be sent out immediately.
The Trailing Character is a special character that is injected into the outgoing data stream right after the Send Character.
Non-printable Send or Trailing characters are normally specified as control characters in the form <control>X and may also be entered in either Hexadecimal (prefix with 0x) or decimal (prefix with \).

Figure 9-7b. Tunnel n Packing Mode (Mode = Timeout)

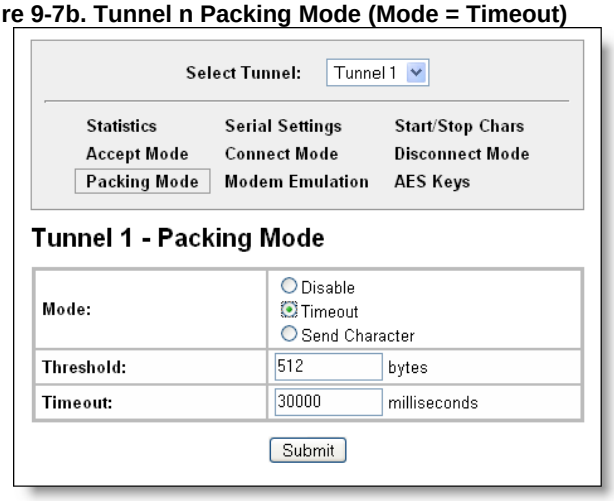
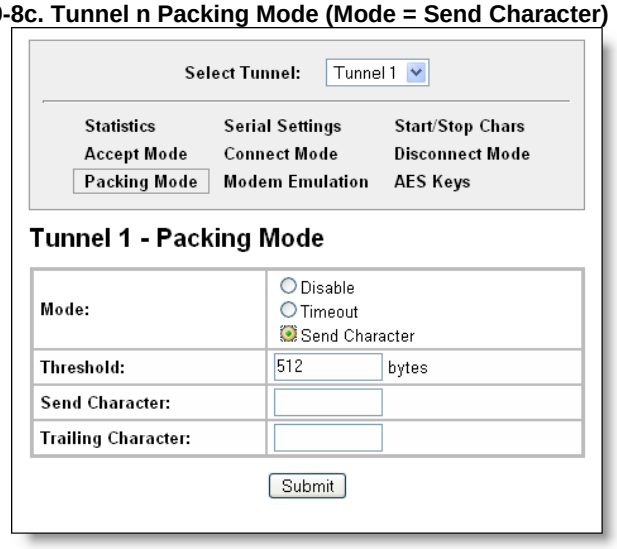


Figure 9-8c. Tunnel n Packing Mode (Mode = Send Character)



2. Enter or modify the following settings:

Tunnel - Packing Mode Page Settings	Description
Mode	Select **Disable** to disable Packing Mode completely. Select **Timeout** to send data after the specified time has elapsed. Select **Send Character** to send the queued data when the send character is received.
Threshold **(Appears for both Timeout and Send Character Modes)**	Send the queued data when the number of queued bytes reaches the threshold.
Timeout **(Appears for Timeout Mode)**	Enter a time, in milliseconds, for the EDS to send the queued data after the first character is received.
Send Character **(Appears for Send Character Mode)**	Enter the send character. The EDS immediately sends out the queued data.
Trailing Character **(Appears for Send Character Mode)**	Enter the trailing character. This character is sent immediately following the send character.

3. Click **Submit.**

Note: *Standard and Non-printable Send or Trailing characters may be specified in either Hexadecimal (prefix with 0x) or decimal (prefix with \).*

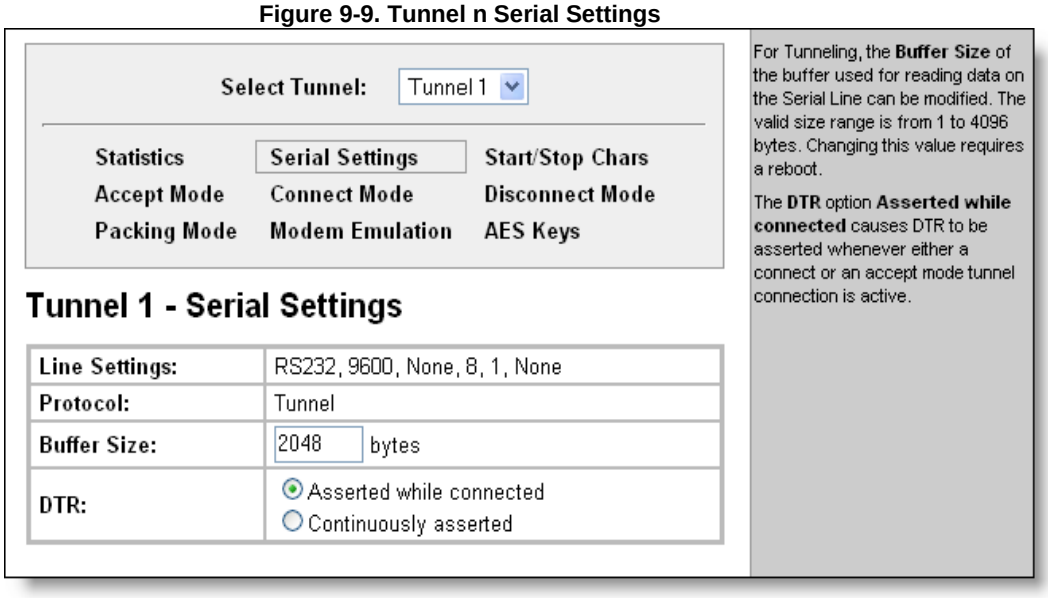
Serial Settings

This page allows you to view and change the settings for the tunnel selected.

Configure serial settings:

1. Click **Tunnel n** and **Serial Settings** at the top of the page. The Tunnel n Serial Settings page appears.

Figure 9-9. Tunnel n Serial Settings


Select Tunnel: Tunnel 1
Statistics
Serial Settings
Start/Stop Chars
Accept Mode
Connect Mode
Disconnect Mode
Packing Mode
Modem Emulation
AES Keys
Tunnel 1 - Serial Settings
Line Settings: RS232, 9600, None, 8, 1, None
Protocol: Tunnel
Buffer Size: 2048 bytes
DTR: Asserted while connected
Continuously asserted
For Tunneling, the Buffer Size of the buffer used for reading data on the Serial Line can be modified. The valid size range is from 1 to 4096 bytes. Changing this value requires a reboot.
The DTR option Asserted while connected causes DTR to be asserted whenever either a connect or an accept mode tunnel connection is active.

2. View or modify the following settings:

Tunnel Serial Settings Page Settings	Description
Line Settings	Current serial settings for the line.
Protocol (display only)	The protocol being used on the line. In this case, Tunnel.
Buffer Size	Enter the buffer size used for the tunneling of serial data received. Requires a reboot to take effect.
DTR	Select when to assert DTR. **Asserted while connected** = asserted whenever either a connect or an accept mode tunnel connection is active. **Continuously asserted** = asserted regardless of the status of a tunnel connection.

3. Click **Submit.**

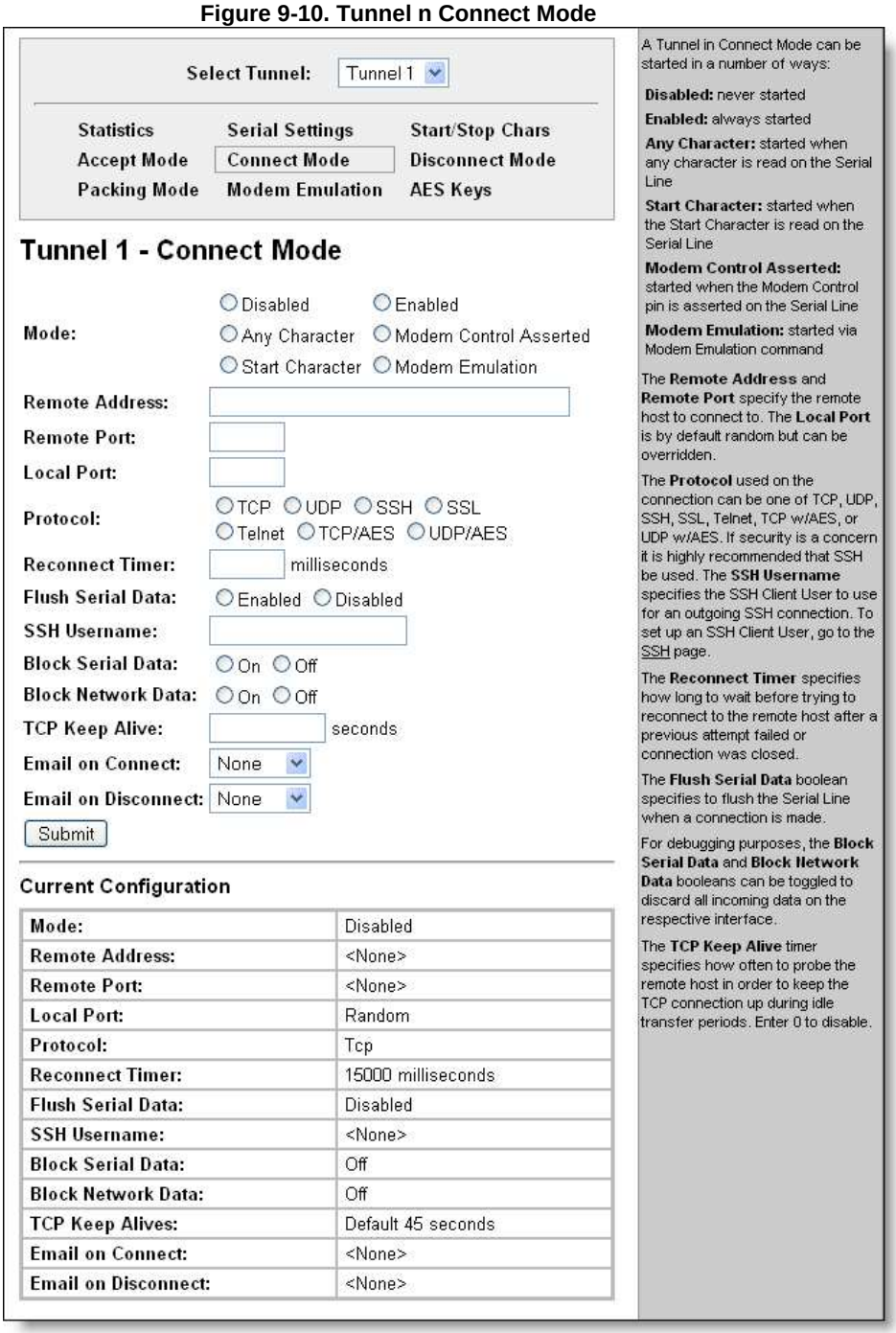
Connect Mode

Connect mode defines how the unit makes an outgoing connection.

Configure Connect Mode:

1. Select **Tunnel n** and **Connect Mode** at the top of the page. The Tunnel n Connect Mode page appears.

Figure 9-10. Tunnel n Connect Mode


Select Tunnel: Tunnel 1
Statistics
Serial Settings
Start/Stop Chars
Accept Mode
Connect Mode
Disconnect Mode
Packing Mode
Modem Emulation
AES Keys
Tunnel 1 - Connect Mode
Mode:
Disabled
Enabled
Any Character
Modem Control Asserted
Start Character
Modem Emulation
Remote Address:
Remote Port:
Local Port:
Protocol:
TCP
UDP
SSH
SSL
Telnet
TCP/AES
UDP/AES
Reconnect Timer:
milliseconds
Flush Serial Data:
Enabled
Disabled
SSH Username:
Block Serial Data:
On
Off
Block Network Data:
On
Off
TCP Keep Alive:
seconds
Email on Connect:
None
Email on Disconnect:
None
Submit
Current Configuration
Mode: Disabled
Remote Address: <None>
Remote Port: <None>
Local Port: Random
Protocol: Tcp
Reconnect Timer: 15000 milliseconds
Flush Serial Data: Disabled
SSH Username: <None>
Block Serial Data: Off
Block Network Data: Off
TCP Keep Alives: Default 45 seconds
Email on Connect: <None>
Email on Disconnect: <None>
A Tunnel in Connect Mode can be started in a number of ways:
Disabled: never started
Enabled: always started
Any Character: started when any character is read on the Serial Line
Start Character: started when the Start Character is read on the Serial Line
Modem Control Asserted: started when the Modem Control pin is asserted on the Serial Line
Modem Emulation: started via Modem Emulation command
The Remote Address and Remote Port specify the remote host to connect to. The Local Port is by default random but can be overridden.
The Protocol used on the connection can be one of TCP, UDP, SSH, SSL, Telnet, TCP w/AES, or UDP w/AES. If security is a concern it is highly recommended that SSH be used. The SSH Username specifies the SSH Client User to use for an outgoing SSH connection. To set up an SSH Client User, go to the SSH page.
The Reconnect Timer specifies how long to wait before trying to reconnect to the remote host after a previous attempt failed or connection was closed.
The Flush Serial Data boolean specifies to flush the Serial Line when a connection is made.
For debugging purposes, the Block Serial Data and Block Network Data booleans can be toggled to discard all incoming data on the respective interface.
The TCP Keep Alive timer specifies how often to probe the remote host in order to keep the TCP connection up during idle transfer periods. Enter 0 to disable.

2. Enter or modify the following settings:

Tunnel – Connect Mode Page Settings	Description
Mode	The method to be used to connect to a remote host or device. **Disabled** = An outgoing connection is never attempted. (This is the default). **Enabled** = A connection is attempted until one is made. If the connection gets disconnected, the EDS retries until it makes a connection. **Any Character** = A connection is attempted when any character is read on the serial line. **Modem Control Asserted** = A connection is attempted as long as the Modem Control pin (DSR) is asserted, until a connection is made. **Start Character** = A connection is attempted when the start character for the selected tunnel is read on the serial line. **Modem Emulation** = A connection is attempted when triggered by modem emulation AT commands.
Remote Address	Enter the remote address to which the EDS will connect. Enter an IP address or DNS name.
Remote Port	Enter the remote port number.
Local Port	Enter the port for use as the local port. A random port is selected by default. Once you have configured a number, click the Random link in the Current Configuration to switch back to Random.
Protocol	Select the protocol type for use in Command Mode. TCP is the default protocol. The protocol can be one of **TCP**, **UDP**, **SSH**, **SSL**, **Telnet**, **TCP with AES**, or **UDP with AES**. If security is a concern, use SSH. The SSH Username specifies the SSH Client User to use for an outgoing SSH connection. To set up an SSH Client User, go to SSH Settings on page 93.
Reconnect Timer	Enter the reconnect time in milliseconds. The EDS attempts to reconnect after this amount of time after failing a connection or exiting an existing connection.
Flush Serial Data	Select whether to flush the serial line when a connection is made. Choices are: **Enabled** = flush the serial line when a connection is made. **Disabled** = do not flush the serial line. (default)

Tunnel – Connect Mode Page Settings	Description
SSH Username	Enter the SSH username. The tunnel uses the SSH keys associated with the client username.
Block Serial Data	Select On to block (not tunnel) serial data transmitted to the EDS.
Block Network Data	Select On to block (not tunnel) network data transmitted to the EDS.
TCP Keep Alive	Enter the time, in seconds, the unit waits during a silent connection before checking whether the currently connected network device is still on the network. If the unit then gets no response after 8 attempts, it drops that connection.
Email on Connect	Select whether the EDS sends an email when a connection is made. Select None if you do not want to send an email. Otherwise, select the Email profile to use.
Email on Disconnect	Select whether the EDS sends an email when a connection is closed. Select None if you do not want to send an email. Otherwise, select the Email profile to use.

3. Click **Submit.**

Modem Emulation

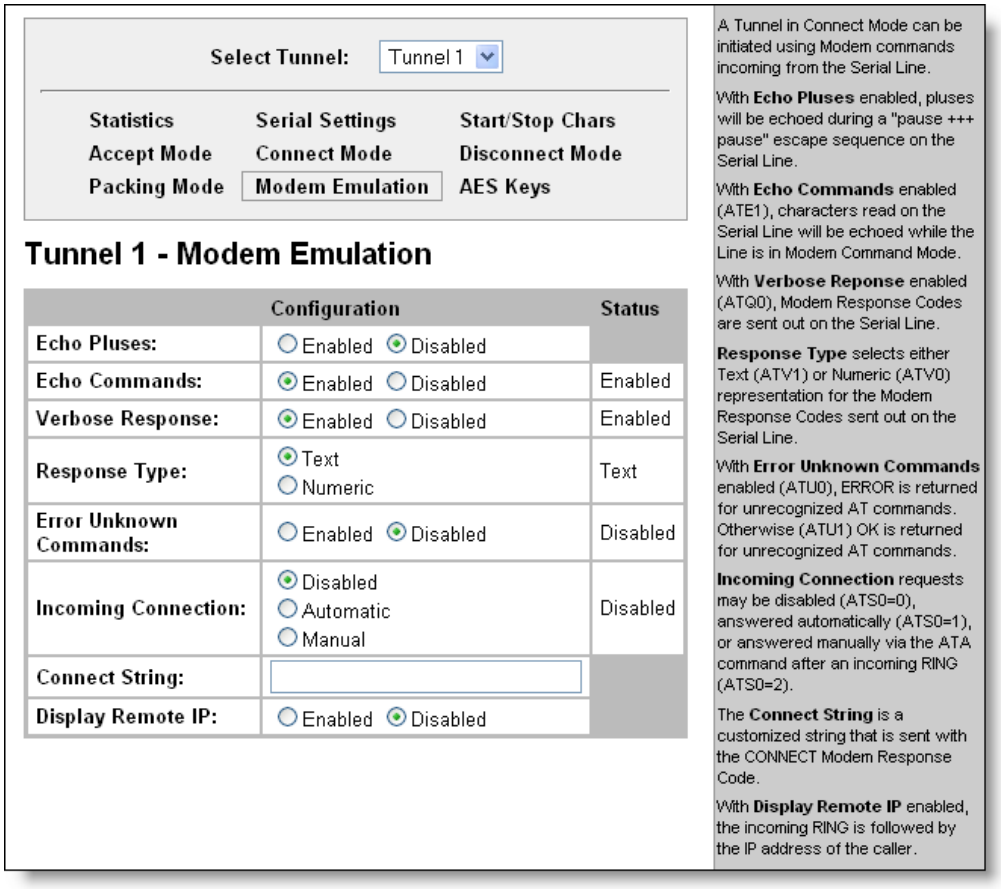
You can initiate a tunnel in Connect Mode using modem commands from the Serial Line.

The modem emulation page enables you to configure the modem emulation settings when you select Modem Emulation as the Tunnel n or Tunnel 2 Connect Mode type.

Configure modem emulation:

1. Select **Tunnel n** and then **Modem Emulation** at the top of the page. The Tunnel n Modem Emulation page appears.

Figure 9-11. Tunnel n Modem Emulation


Select Tunnel: Tunnel 1
Statistics
Serial Settings
Start/Stop Chars
Accept Mode
Connect Mode
Disconnect Mode
Packing Mode
Modem Emulation
AES Keys
Tunnel 1 - Modem Emulation
Configuration
Status
Echo Pluses:
Enabled Disabled
Echo Commands:
Enabled Disabled
Enabled
Verbose Response:
Enabled Disabled
Enabled
Response Type:
Text
Numeric
Text
Error Unknown Commands:
Enabled Disabled
Disabled
Incoming Connection:
Disabled
Automatic
Manual
Disabled
Connect String:
Display Remote IP:
Enabled Disabled
A Tunnel in Connect Mode can be initiated using Modem commands incoming from the Serial Line.
With Echo Pluses enabled, pluses will be echoed during a "pause +++ pause" escape sequence on the Serial Line.
With Echo Commands enabled (ATE1), characters read on the Serial Line will be echoed while the Line is in Modem Command Mode.
With Verbose Reponse enabled (ATQ0), Modem Response Codes are sent out on the Serial Line.
Response Type selects either Text (ATV1) or Numeric (ATV0) representation for the Modem Response Codes sent out on the Serial Line.
With Error Unknown Commands enabled (ATU0), ERROR is returned for unrecognized AT commands. Otherwise (ATU1) OK is returned for unrecognized AT commands.
Incoming Connection requests may be disabled (ATS0=0), answered automatically (ATS0=1), or answered manually via the ATA command after an incoming RING (ATS0=2).
The Connect String is a customized string that is sent with the CONNECT Modem Response Code.
With Display Remote IP enabled, the incoming RING is followed by the IP address of the caller.

2. Enter or modify the following settings:

Tunnel- Modem Emulation Page Settings	Description
Echo Pluses	Select **Enabled** to echo **+++** when entering modem Command Mode.
Echo Commands	Select **Enabled** (same as modem command ATE1)to echo the modem commands to the console.
Verbose Response	Select **Enabled** (same as modem command ATQ0)to send modem response codes out on the serial line.
Response Type	Select the type of response code: **Text** (same as modem command ATV1) or **Numeric** (same as modem command ATV0).
Error Unknown Commands	Select whether an **ERROR** or **OK** response is sent in reply to unrecognized AT commands. With **Enabled** selected (same as modem command ATU0), **ERROR** is returned for unrecognized AT commands. With **Disabled** selected (same as modem command ATU1), **OK** is returned for unrecognized AT commands. (default)
Incoming Connection:	Select either **Disabled** (same as modem command ATS0=0), **Automatic**(same as modem command ATS0=1), or **Manual** (same as modem command ATS0=2).
Connect String	Enter the connect string. This modem initialization string prepares the modem for communications. It is a customized string sent with the “CONNECT” modem response code.
Display Remote IP:	With Display Remote IP **Enabled**, the incoming RING is followed by the IP address of the caller.

3. Click **Submit.**

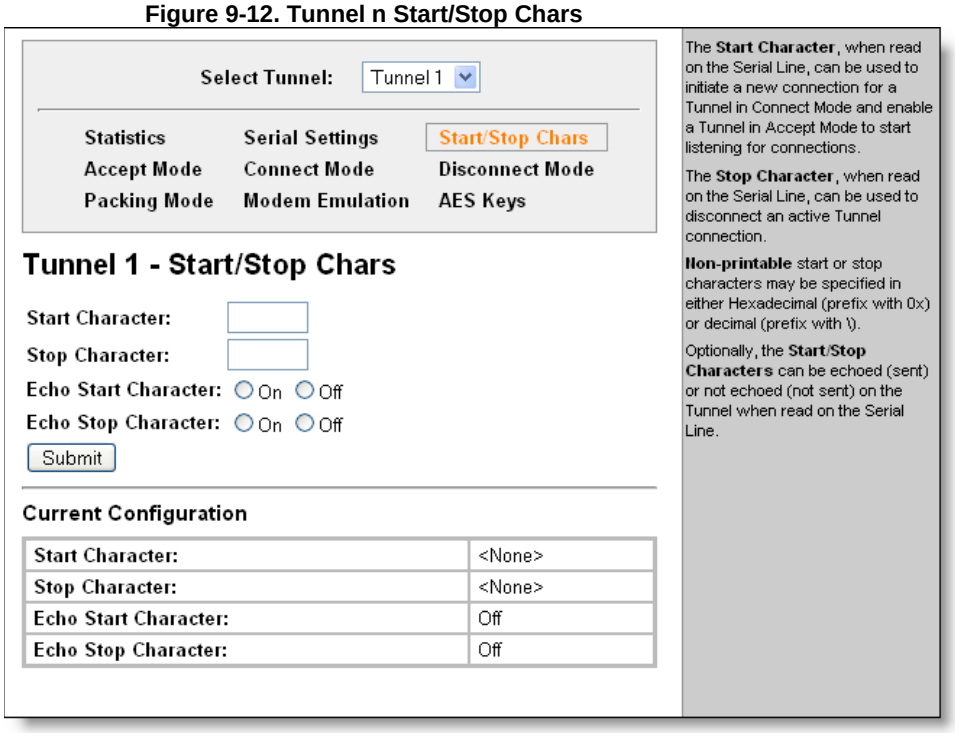
Start and Stop Characters

The Start/Stop Chars page enables you to configure the EDS to start a tunnel when it receives a specific start character from the serial port and to disconnect upon receiving the stop character.

Configure the start and stop characters mode:

1. Select **Tunnel n** and **Start/Stop Chars** at the top of the page. The Tunnel n Start/Stop Chars page appears.

Figure 9-12. Tunnel n Start/Stop Chars


Select Tunnel: Tunnel 1
Statistics
Serial Settings
Start/Stop Chars
Accept Mode
Connect Mode
Disconnect Mode
Packing Mode
Modem Emulation
AES Keys
Tunnel 1 - Start/Stop Chars
Start Character:
Stop Character:
Echo Start Character: On Off
Echo Stop Character: On Off
Submit
Current Configuration
Start Character: <None>
Stop Character: <None>
Echo Start Character: Off
Echo Stop Character: Off
The Start Character, when read on the Serial Line, can be used to initiate a new connection for a Tunnel in Connect Mode and enable a Tunnel in Accept Mode to start listening for connections.
The Stop Character, when read on the Serial Line, can be used to disconnect an active Tunnel connection.
Non-printable start or stop characters may be specified in either Hexadecimal (prefix with 0x) or decimal (prefix with \).
Optionally, the Start/Stop Characters can be echoed (sent) or not echoed (not sent) on the Tunnel when read on the Serial Line.

2. Enter or modify the following settings:

Tunnel – Start/Stop Chars Page Settings	Description
Start Character	Enter the start character in ASCII, hexadecimal, or decimal notation.
Stop Character	Enter the stop character in ASCII, hexadecimal, or decimal notation.
Echo Start Character	Select **On** to forward (tunnel) the start character.
Echo Stop Character	Select **On** to forward (tunnel) the stop character.

3. Click **Submit.**

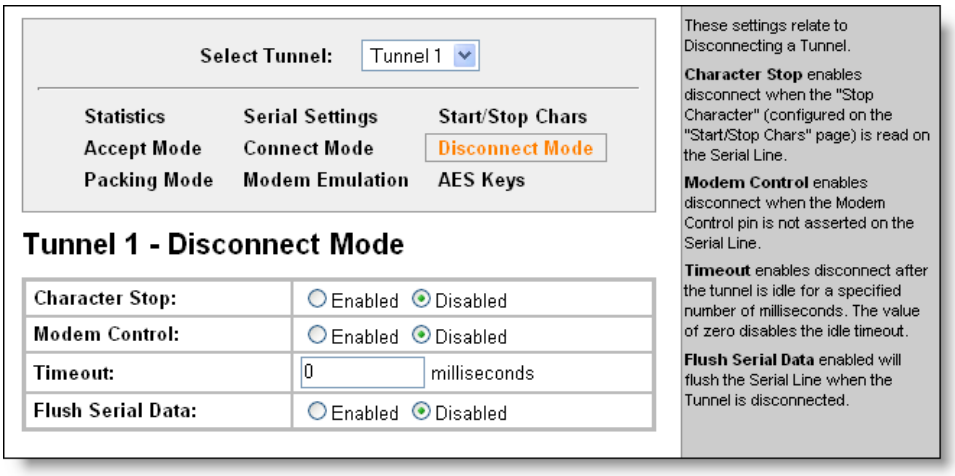
Disconnect Mode

Disconnect Mode is disabled by default. When enabled, Disconnect Mode runs in the background of an active connection to determine when a disconnection is required.

Configure the tunnel Disconnect Mode:

1. Click **Tunnel n** and **Disconnect Mode** at the top of the page. The Tunnel n Disconnect Mode page appears.

Figure 9-13. Tunnel n Disconnect Mode


Select Tunnel:
Tunnel 1
Statistics
Serial Settings
Start/Stop Chars
Accept Mode
Connect Mode
Disconnect Mode
Packing Mode
Modem Emulation
AES Keys
Tunnel 1 - Disconnect Mode
Character Stop:
Enabled
Disabled
Modem Control:
Enabled
Disabled
Timeout:
0
milliseconds
Flush Serial Data:
Enabled
Disabled
These settings relate to Disconnecting a Tunnel.
Character Stop enables disconnect when the "Stop Character" (configured on the "Start/Stop Chars" page) is read on the Serial Line.
Modem Control enables disconnect when the Modem Control pin is not asserted on the Serial Line.
Timeout enables disconnect after the tunnel is idle for a specified number of milliseconds. The value of zero disables the idle timeout.
Flush Serial Data enabled will flush the Serial Line when the Tunnel is disconnected.

2. Enter or modify the following settings:

Tunnel – Disconnect Mode Page Settings	Description
Character Stop	Select **Enabled** to disconnect upon receiving the stop character. (See Start and Stop Characters on page 69 for instructions on configuring the stop character.)
Modem Control	Select **Enabled** to disconnect when the modem control pin is not asserted on the serial line.
Timeout	Enter a time, in milliseconds, for the EDS to disconnect on a timeout. The value 0 (zero) disables the idle timeout.
Flush Serial Data	Select **Enabled** to flush the serial data buffer on a disconnection.

3. Click **Submit.**

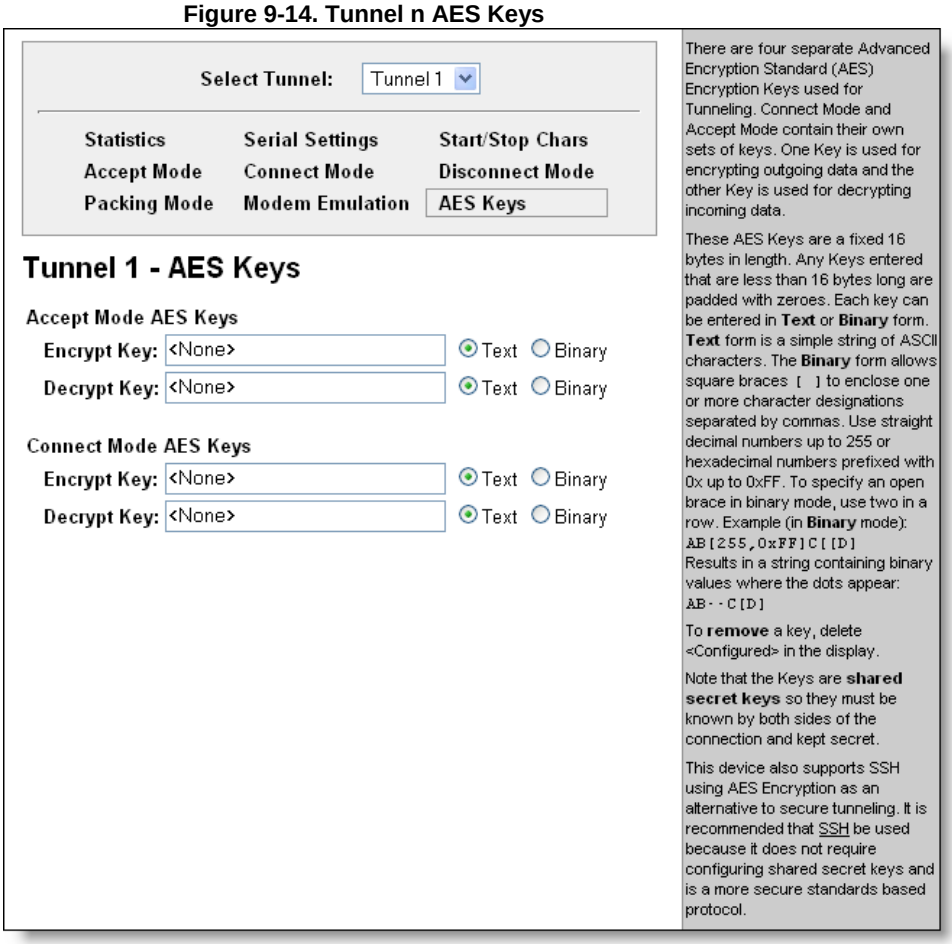
AES Keys

Advanced Encryption Standard (AES) is an encryption algorithm for securing sensitive information by government agencies.

Configure the AES keys for connect or Accept Mode:

1. Click **Tunnel n** and **AES Keys**. The Tunnel n AES Keys page appears.

Figure 9-14. Tunnel n AES Keys


Select Tunnel: Tunnel 1
Statistics
Serial Settings
Start/Stop Chars
Accept Mode
Connect Mode
Disconnect Mode
Packing Mode
Modem Emulation
AES Keys
Tunnel 1 - AES Keys
Accept Mode AES Keys
Encrypt Key: <None> Text Binary
Decrypt Key: <None> Text Binary
Connect Mode AES Keys
Encrypt Key: <None> Text Binary
Decrypt Key: <None> Text Binary
There are four separate Advanced Encryption Standard (AES) Encryption Keys used for Tunneling. Connect Mode and Accept Mode contain their own sets of keys. One Key is used for encrypting outgoing data and the other Key is used for decrypting incoming data.
These AES Keys are a fixed 16 bytes in length. Any Keys entered that are less than 16 bytes long are padded with zeroes. Each key can be entered in Text or Binary form. Text form is a simple string of ASCII characters. The Binary form allows square braces [ ] to enclose one or more character designations separated by commas. Use straight decimal numbers up to 255 or hexadecimal numbers prefixed with 0x up to 0xFF. To specify an open brace in binary mode, use two in a row. Example (in Binary mode): AB[255,0xFF]C[[D] Results in a string containing binary values where the dots appear: AB··C[D]
To remove a key, delete <Configured> in the display.
Note that the Keys are shared secret keys so they must be known by both sides of the connection and kept secret.
This device also supports SSH using AES Encryption as an alternative to secure tunneling. It is recommended that SSH be used because it does not require configuring shared secret keys and is a more secure standards based protocol.

2. Enter or modify the following settings:

*Note: Empty trailing byes that are not specified are set to **0**.*

Tunnel – AES Keys Page Settings	Description
Accept Mode AES Keys	
Encrypt Key	1. Enter the value for each byte of the encryption key. 2. Select the format for the byte as either **Text** or **Binary**. Binary form is a string of characters representing byte values where each hexadecimal byte value

Tunnel – AES Keys Page Settings	Description
	starts with **\0x** and each decimal byte value starts with ****.
Decrypt Key	Enter the value for each byte of the decrypt key. Select the format for the bytes as either **Text or Binary**.
Connect Mode AES Keys	
Encrypt Key	Enter the value for each byte. Select the format for the byte as either **Text** or **Binary**.
Decrypt Key	Enter the value for each byte of the decrypt key. Select the format for the byte as either **Text** or **Binary**.

3. Click **Submit.**

Terminal Settings

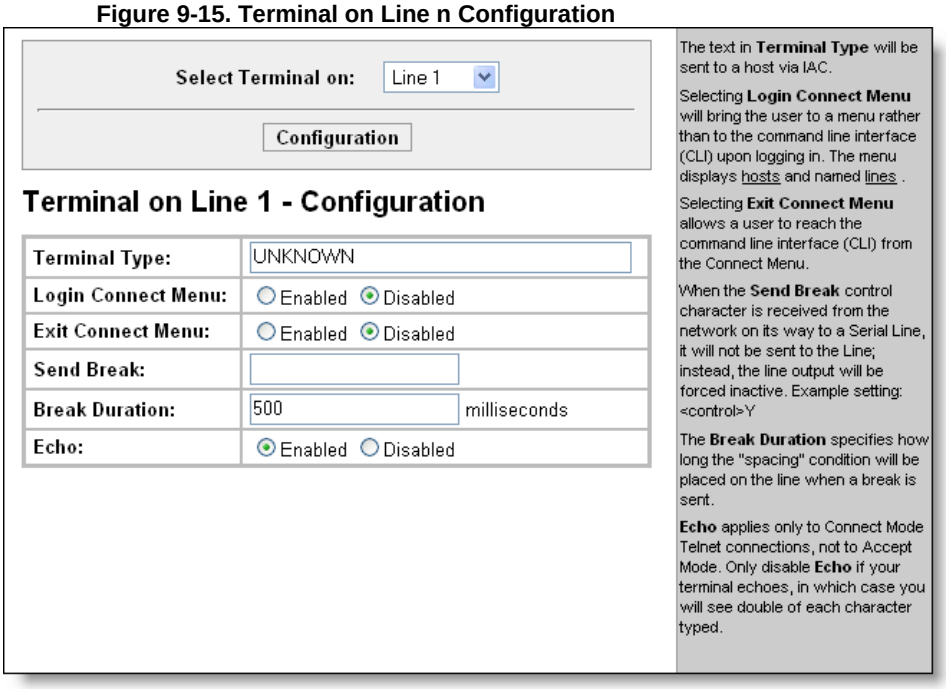
This page shows configuration settings for attaching a terminal on a serial line or the network and lets you change them as necessary.

Line Terminal Configuration

Configure a line to support an attached terminal:

1. Click **Terminal** on the menu and then select the line that is connected to the terminal you want to configure. The default is **Line n**. Configuration is automatically selected. The Terminal on Line n Configuration page appears.

Figure 9-15. Terminal on Line n Configuration


Select Terminal on:
Line 1
Configuration
Terminal on Line 1 - Configuration
Terminal Type:
UNKNOWN
Login Connect Menu:
Enabled
Disabled
Exit Connect Menu:
Enabled
Disabled
Send Break:
Break Duration:
500
milliseconds
Echo:
Enabled
Disabled
The text in Terminal Type will be sent to a host via IAC.
Selecting Login Connect Menu will bring the user to a menu rather than to the command line interface (CLI) upon logging in. The menu displays hosts and named lines .
Selecting Exit Connect Menu allows a user to reach the command line interface (CLI) from the Connect Menu.
When the Send Break control character is received from the network on its way to a Serial Line, it will not be sent to the Line; instead, the line output will be forced inactive. Example setting: <control>Y
The Break Duration specifies how long the "spacing" condition will be placed on the line when a break is sent.
Echo applies only to Connect Mode Telnet connections, not to Accept Mode. Only disable Echo if your terminal echoes, in which case you will see double of each character typed.

2. Enter or modify the following settings:

Terminal on Line Configuration Page Settings	Description
Terminal Type	Enter text to describe the type of terminal. The text will be sent to a host via IAC. ***Note:*** *IAC means, "interpret as command." It is a way to send commands over the network such as* `send break` *or* `start echoing`.
Login Connect Menu	Select the interface to display when the user logs in. Choices are: **Enabled** = shows the Login Connect Menu. **Disabled** = shows the CLI
Exit Connect Menu	Select whether to display a choice for the user to exit the Login Connect Menu and reach the CLI. Choices are: **Enabled** = a choice allows the user to exit to the CLI. **Disabled** = there is no exit to the CLI.
Send Break	Enter a Send Break control character, e.g., <control> Y, or blank to disable. When the Send Break control character is received from the network on its way to the serial line, it is not sent to the line; instead, the line output is forced to be inactive (the break condition).
Break Duration	Enter how long the break should last in milliseconds.
Echo	Applies only to Connect Mode Telnet connections, not to Accept Mode. Only disable **Echo** if your terminal echoes, in which case you will see double of each character typed.

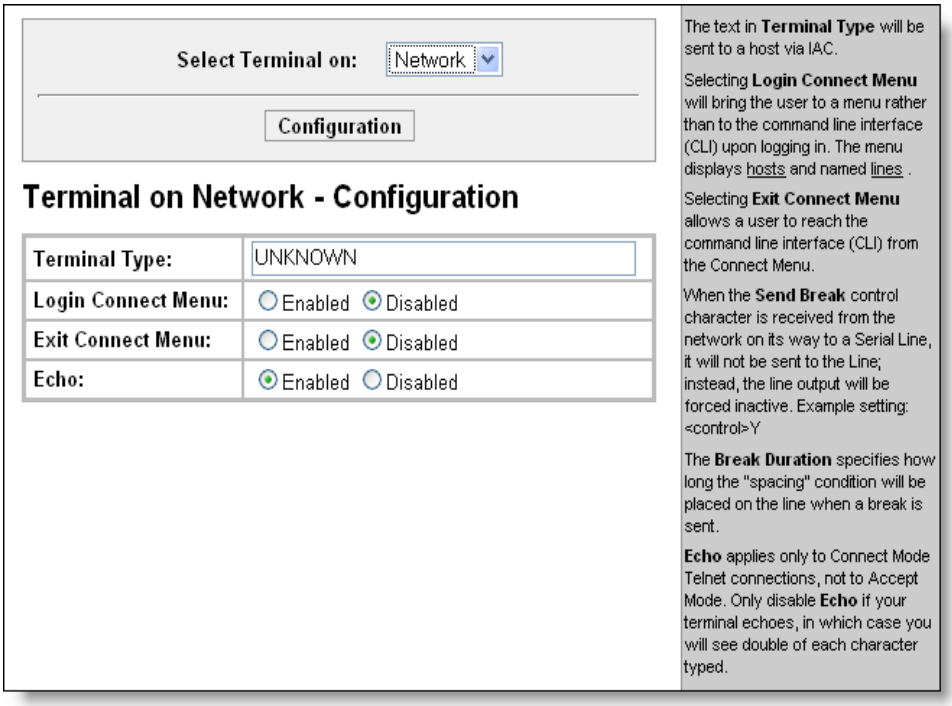
3. To save changes, click **Submit.**

Network Terminal Configuration

Configure menu features applicable to CLI access via the network:

1. Click **Terminal** on the menu then **Network** at the top of the page. Configuration is automatically selected. The Terminal on Network Configuration page appears.

Figure 9-16. Terminal on Network Configuration


Select Terminal on:
Network
Configuration
Terminal on Network - Configuration
Terminal Type:
UNKNOWN
Login Connect Menu:
Enabled
Disabled
Exit Connect Menu:
Enabled
Disabled
Echo:
Enabled
Disabled
The text in Terminal Type will be sent to a host via IAC.
Selecting Login Connect Menu will bring the user to a menu rather than to the command line interface (CLI) upon logging in. The menu displays hosts and named lines .
Selecting Exit Connect Menu allows a user to reach the command line interface (CLI) from the Connect Menu.
When the Send Break control character is received from the network on its way to a Serial Line, it will not be sent to the Line; instead, the line output will be forced inactive. Example setting: <control>Y
The Break Duration specifies how long the "spacing" condition will be placed on the line when a break is sent.
Echo applies only to Connect Mode Telnet connections, not to Accept Mode. Only disable Echo if your terminal echoes, in which case you will see double of each character typed.

2. Enter or modify the following settings:

Terminal on Line Configuration Page	Description
Terminal Type	Enter text to describe the type of terminal. The text will be sent to a host via IAC. ***Note:*** *IAC means, "interpret as command." It is a way to send commands over the network such as* `send break` *or* `start echoing`.
Login Connect Menu	Select the interface to display when the user logs in. Choices are: **Enabled** = shows the Login Connect Menu. **Disabled** = shows the CLI
Exit Connect Menu	Select whether to display a choice for the user to exit the Login Connect Menu and reach the CLI. Choices are: **Enabled** = a choice allows the user to exit to the CLI. **Disabled** = there is no exit to the CLI.

Terminal on Line Configuration Page	Description
Echo	Applies only to Connect Mode Telnet connections, not to Accept Mode. Only disable **Echo** if your terminal echoes, in which case you will see double of each character typed.

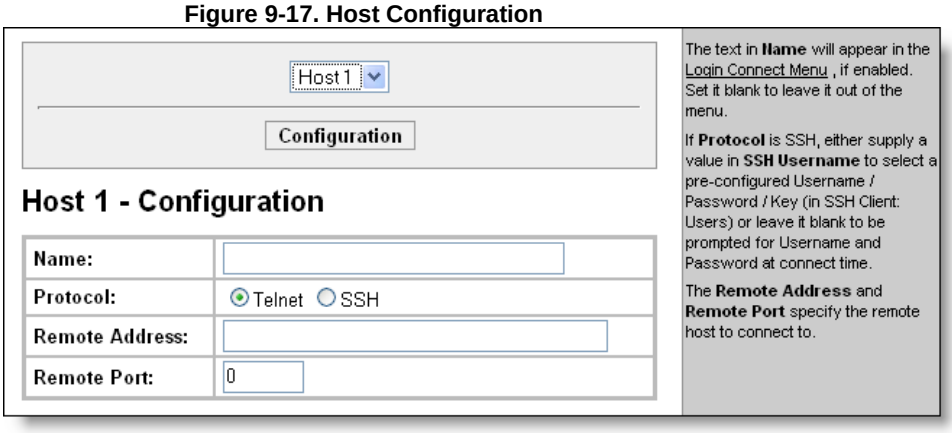
3. Click **Submit.**

Host Configuration

This page shows current settings for a remote host and lets you change these settings. Use these settings to add host destinations to the Login Connect Menu.

1. Click **Host** on the menu and then click the desired host at the top of the page. Configuration is automatically selected. (Host 1 is the default.) The Host Configuration page appears.

Figure 9-17. Host Configuration


Host 1
Configuration
Host 1 - Configuration
Name:
Protocol:
Telnet
SSH
Remote Address:
Remote Port:
0
The text in Name will appear in the Login Connect Menu , if enabled. Set it blank to leave it out of the menu.
If Protocol is SSH, either supply a value in SSH Username to select a pre-configured Username / Password / Key (in SSH Client: Users) or leave it blank to be prompted for Username and Password at connect time.
The Remote Address and Remote Port specify the remote host to connect to.

2. Enter or modify the following settings:

Host Page Settings	Description
Name	A name for the host. This name appears on the Login Connect Menu. To leave a host out of the menu, leave this field blank.
Protocol	The protocol to use to connect to the host. Choices are: **Telnet** **SSH** ***Note:*** *SSH keys must be loaded or created on the SSH page for the SSH protocol to work.*
SSH Username	Appears if you selected **SSH** as the protocol. Enter a username to select a pre-configured Username/Password/Key (configured on the SSH: Client Users page), —Or— Leave it blank to be prompted for a username and password at connect time.

Host Page Settings	Description
Remote Address	IP address for the host.
Remote Port	Port on the host to which the EDS will connect.

3. Click **Submit.**

Login Connect Menu

As an administrator, you can set up a menu on the EDS for terminal users.

For a terminal attached to serial Line N, set as follows:

- Line[N] Protocol = None
- Line[N] Command Mode = Always
- Terminal[Line N] Login Connect Menu = Enabled.

For Telnet-attached terminals, set:

- Terminal [Network] Login Connect Menu = Enabled.

You will see a menu like this:

```
Password :
Connection menu: (select by number)
  1) Alpha                          2) Beta
  3) Exit to command line interface  4) Log out
Selection =
```

1. Add a destination serial line M to the menu by filling in **Line[M] Name**. For this purpose, set:
   - Line[M] Protocol = None
   - Line[M] Command Mode = Disabled.
2. Add a network destination to the menu by setting up a **Host** entry for it. Each named **Host** entry will appear in the menu.
3. Add the **Exit to command line interface** choice to the menu by setting: Terminal[Line N] or Terminal[Network] Exit Connect Menu = Enabled.

The **Log out** choice is always present.

Preview the Login Connect Menu

The Login Connect Menu can be previewed without actually connecting in via a serial line or telnet connection.

From the Web Manager, go to the Terminal page. If “Login Connect Menu” is enabled, you will see a preview layout in the lower part of the page.

From the Command Line Interface, go to the config-terminal level. Use the “preview connect menu” command.

10: Services Settings

DNS Configuration

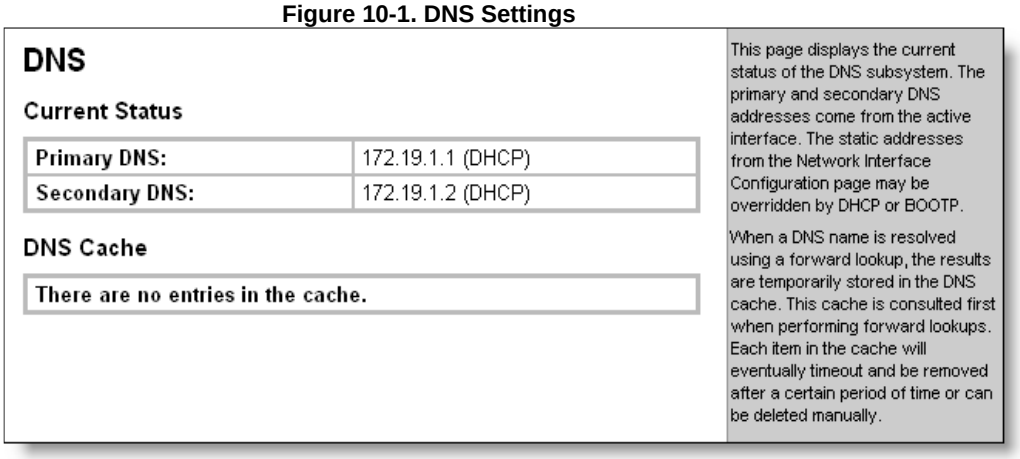
This page shows the active run-time settings for the domain name system (DNS) protocol. The primary and secondary DNS addresses come from the active interface. The static addresses from the Network Interface Configuration page may be overridden by DHCP or BOOTP.

The DNS page also shows any contents in the DNS cache. When a DNS name is resolved using a forward lookup, the results are stored in the DNS cache temporarily. The EDS consults this cache when performing forward lookups. Each item in the cache eventually times out and is removed automatically after a certain period, or you can delete it manually.

View the EDS DNS configuration:

One Step Click **DNS** on the menu bar. The DNS page appears.

Figure 10-1. DNS Settings


DNS
Current Status
Primary DNS:
172.19.1.1 (DHCP)
Secondary DNS:
172.19.1.2 (DHCP)
DNS Cache
There are no entries in the cache.
This page displays the current status of the DNS subsystem. The primary and secondary DNS addresses come from the active interface. The static addresses from the Network Interface Configuration page may be overridden by DHCP or BOOTP.
When a DNS name is resolved using a forward lookup, the results are temporarily stored in the DNS cache. This cache is consulted first when performing forward lookups. Each item in the cache will eventually timeout and be removed after a certain period of time or can be deleted manually.

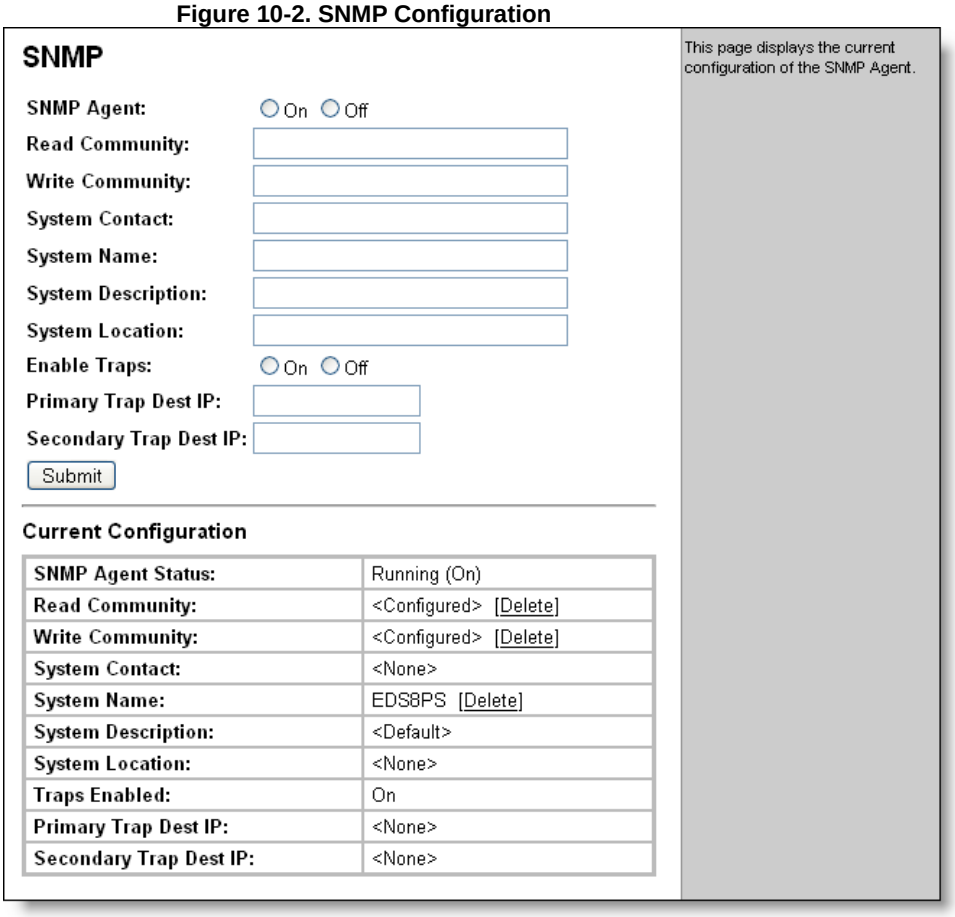
SNMP Configuration

This page is used to configure the Simple Network Management Protocol (SNMP) agent. Using this page, you can configure the SNMP service to send a trap when it receives a request for information that contains an incorrect community name and does not match an accepted system name for the service.

Configure SNMP:

1. Click **SNMP** on the menu bar. The SNMP page opens and shows the current SNMP configuration.

Figure 10-2. SNMP Configuration



2. Enter or modify the following settings:

SNMP Page Settings	Description
SNMP Agent	Select On to enable SNMP.
Read Community	Enter the SNMP read-only community string.
Write Community	Enter the SNMP read/write community string.
System Contact	Enter the name of the system contact.
System Name	Enter the system name.
System Description	Enter the system description.
System Location	Enter the system location.
Enable Traps	Select On to enable the transmission of the SNMP cold start trap messages. This trap is generated

SNMP Page Settings	Description
	during system boot.
Primary Trap Dest IP	Enter the primary SNMP trap host.
Secondary Trap Dest IP	Enter the secondary SNMP trap host.

3. Click **Submit.**

4. In the **Current Configuration** table, delete and clear currently stored settings as necessary.

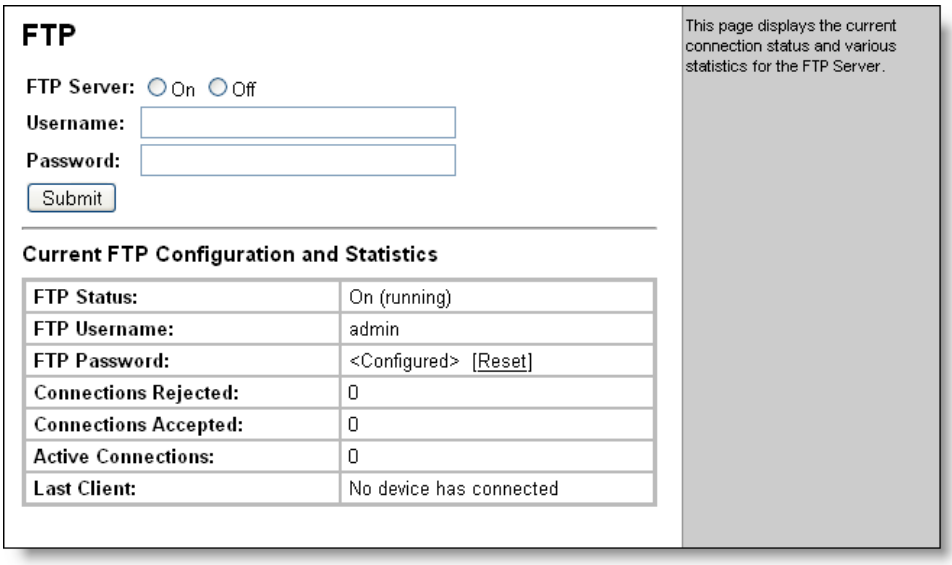
FTP Configuration

This page shows the current File Transfer Protocol (FTP) configuration and connection status and various statistics about the FTP server.

Configure FTP:

1. Click **FTP** on the menu bar. The FTP page opens to display the current configuration.

Figure 10-3. FTP Configuration



2. Enter or modify the following settings:

FTP Page Settings	Description
FTP Server	Select **On** to enable the FTP server.
Username	Enter the username to use when logging in via FTP.
Password	Enter the password to use when logging in via FTP.

3. Click **Submit.**

One Step Click [**Reset**] to reset the FTP Password.

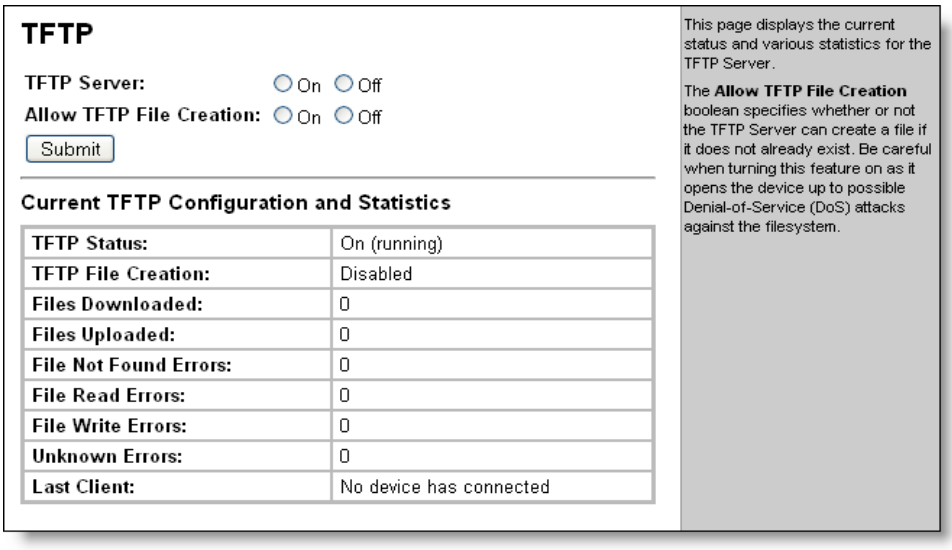
TFTP Configuration

This page shows the status and various statistics about the Trivial File Transfer Protocol (TFTP) server.

Configure TFTP:

1. Click **TFTP** on the menu bar. The TFTP page opens to display the current configuration.

Figure 10-4. TFTP Configuration


TFTP
TFTP Server: On Off
Allow TFTP File Creation: On Off
Submit
Current TFTP Configuration and Statistics
TFTP Status: On (running)
TFTP File Creation: Disabled
Files Downloaded: 0
Files Uploaded: 0
File Not Found Errors: 0
File Read Errors: 0
File Write Errors: 0
Unknown Errors: 0
Last Client: No device has connected
This page displays the current status and various statistics for the TFTP Server.
The Allow TFTP File Creation boolean specifies whether or not the TFTP Server can create a file if it does not already exist. Be careful when turning this feature on as it opens the device up to possible Denial-of-Service (DoS) attacks against the filesystem.

2. Enter or modify the following settings:

TFTP Page Settings	Description
TFTP Server	Select On to enable the TFTP server.
Allow TFTP File Creation	Select whether to allow the creation of new files stored on the TFTP server.

3. Click **Submit.**

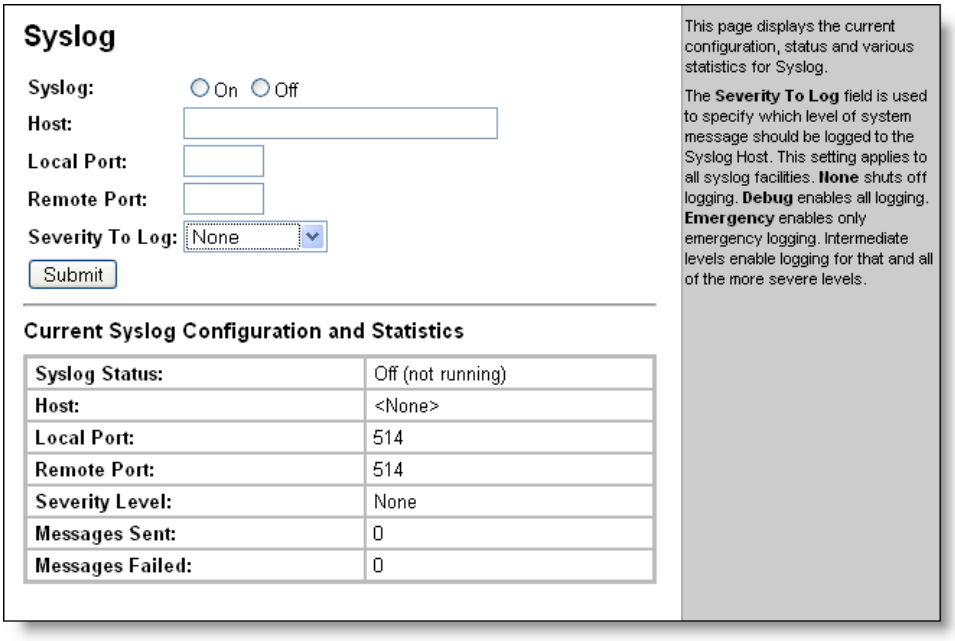
Syslog Configuration

The Syslog page shows the current configuration, status, and statistics of the syslog. Here you can configure the syslog destination and the severity of the events to log.

***Note**: The system log is not retained through reboots. Saving the system log to a server that supports remote logging services (see RFC 3164) allows the administrator to save the complete system log history. The default port is 514.*

1. Click **Syslog** on the menu bar. The Syslog page opens to display the current configuration.

Figure 10-5. Syslog


Syslog
Syslog: On Off
Host:
Local Port:
Remote Port:
Severity To Log: None
Submit
Current Syslog Configuration and Statistics
Syslog Status: Off (not running)
Host: <None>
Local Port: 514
Remote Port: 514
Severity Level: None
Messages Sent: 0
Messages Failed: 0
This page displays the current configuration, status and various statistics for Syslog.
The Severity To Log field is used to specify which level of system message should be logged to the Syslog Host. This setting applies to all syslog facilities. None shuts off logging. Debug enables all logging. Emergency enables only emergency logging. Intermediate levels enable logging for that and all of the more severe levels.

2. Enter or modify the following settings:

Syslog Page Settings	Description
Syslog	Select to enable or disable the syslog.
Host	Enter the IP address of the remote server to which system logs are sent for storage.
Local Port	Enter the number of the local port on the EDS from which system logs are sent.
Remote Port	Enter the number of the port on the remote server that supports logging services. The default is **514**.
Severity to Log	From the drop-down box, select the minimum level of system message the EDS should log. This setting applies to all syslog facilities. The drop-down list is in descending order of severity (e.g., **Emergency** is more severe than **Alert.**). Message logging will include all severities up to the selected level. Selecting the Debug severity will log all system message.

HTTP Configuration

Hypertext Transfer Protocol (HTTP) is the transport protocol for communicating hypertext documents on the Internet.

HTTP defines how messages are formatted and transmitted. It also defines the actions web servers and browsers should take in response to different commands.

This page has three links at the top for viewing statistics and for viewing and changing configuration and authentication settings.

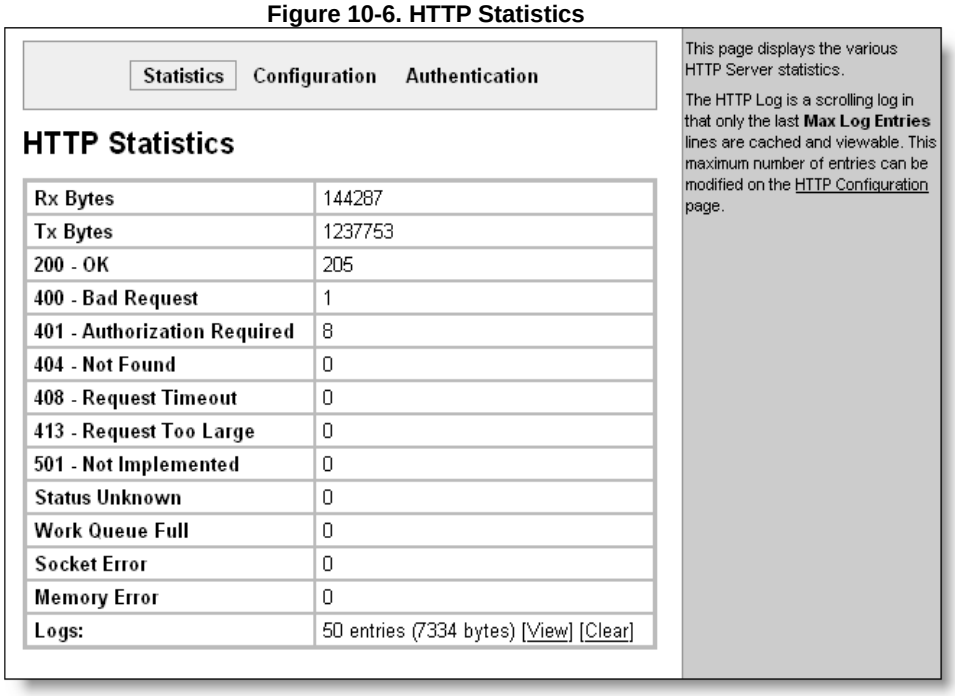
HTTP Statistics

***Note**: The HTTP log is a scrolling log, with the last Max Log Entries cached and viewable. You can change the maximum number of entries that can be viewed on the HTTP Configuration Page.*

View HTTP statistics:

One Step Click HTTP on the menu bar and then Statistics at the top of the page. The HTTP Statistics page appears.

Figure 10-6. HTTP Statistics


Statistics
Configuration
Authentication
HTTP Statistics
Rx Bytes 144287
Tx Bytes 1237753
200 - OK 205
400 - Bad Request 1
401 - Authorization Required 8
404 - Not Found 0
408 - Request Timeout 0
413 - Request Too Large 0
501 - Not Implemented 0
Status Unknown 0
Work Queue Full 0
Socket Error 0
Memory Error 0
Logs: 50 entries (7334 bytes) [View] [Clear]
This page displays the various HTTP Server statistics.
The HTTP Log is a scrolling log in that only the last Max Log Entries lines are cached and viewable. This maximum number of entries can be modified on the HTTP Configuration page.

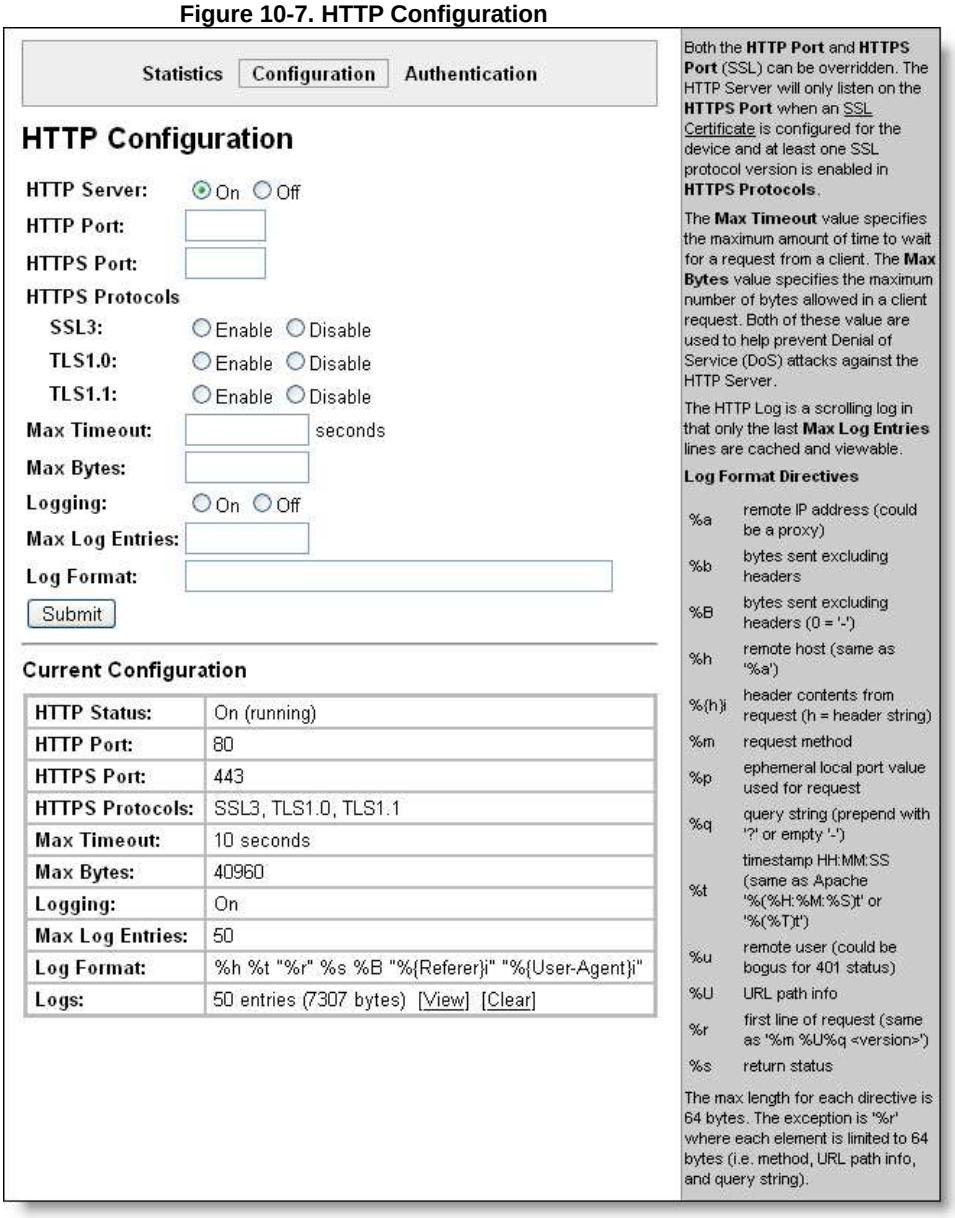
Change HTTP Configuration

On this page you can change HTTP configuration settings.

Configure HTTP:

1. Click **HTTP** on the menu bar and then **Configuration** at the top of the page. The HTTP Configuration page opens.

Figure 10-7. HTTP Configuration


Statistics
Configuration
Authentication
HTTP Configuration
HTTP Server: On Off
HTTP Port:
HTTPS Port:
HTTPS Protocols
SSL3: Enable Disable
TLS1.0: Enable Disable
TLS1.1: Enable Disable
Max Timeout: seconds
Max Bytes:
Logging: On Off
Max Log Entries:
Log Format:
Submit
Current Configuration
HTTP Status: On (running)
HTTP Port: 80
HTTPS Port: 443
HTTPS Protocols: SSL3, TLS1.0, TLS1.1
Max Timeout: 10 seconds
Max Bytes: 40960
Logging: On
Max Log Entries: 50
Log Format: %h %t "%r" %s %B "%{Referer}i" "%{User-Agent}i"
Logs: 50 entries (7307 bytes) [View] [Clear]
Both the HTTP Port and HTTPS Port (SSL) can be overridden. The HTTP Server will only listen on the HTTPS Port when an SSL Certificate is configured for the device and at least one SSL protocol version is enabled in HTTPS Protocols.
The Max Timeout value specifies the maximum amount of time to wait for a request from a client. The Max Bytes value specifies the maximum number of bytes allowed in a client request. Both of these value are used to help prevent Denial of Service (DoS) attacks against the HTTP Server.
The HTTP Log is a scrolling log in that only the last Max Log Entries lines are cached and viewable.
Log Format Directives
%a remote IP address (could be a proxy)
%b bytes sent excluding headers
%B bytes sent excluding headers (0 = '-')
%h remote host (same as '%a')
%{h}i header contents from request (h = header string)
%m request method
%p ephemeral local port value used for request
%q query string (prepend with '?' or empty '-')
%t timestamp HH:MM:SS (same as Apache '%{%H:%M:%S}t' or '%{%T}t')
%u remote user (could be bogus for 401 status)
%U URL path info
%r first line of request (same as '%m %U%q <version>')
%s return status
The max length for each directive is 64 bytes. The exception is '%r' where each element is limited to 64 bytes (i.e. method, URL path info, and query string).

2. Enter or modify the following settings:

HTTP Configuration	Description
HTTP Server	Select **On** to enable the HTTP server.

HTTP Configuration	Description
HTTP Port	Enter the port for the HTTP server to use. The default is **80**.
HTTPS Port	Enter the port for the HTTPS server to use. The default is **443**. The HTTP server only listens on the **HTTPS Port** when an SSL certificate is configured.
HTTPS Protocols	Select to enable or disable the following protocols: **SSL3** = Secure Sockets Layer version 3 **TLS1.0** = Transport Layer Security version 1.0. TLS 1.0 is the successor of SSL3 as defined by the IETF. **TLS1.1** = Transport Layer Security version 1.1 The protocols are enabled by default. A server certificate and associated private key need to be installed in the **SSL** configuration section to use **HTTPS**.
Max Timeout	Enter the maximum time for the HTTP server to wait when receiving a request. This prevents Denial-of-Service (DoS) attacks. The default is **10** seconds.
Max Bytes	Enter the maximum number of bytes the HTTP server accepts when receiving a request. The default is **40** kB (this prevents DoS attacks).
Logging	Select **On** to enable HTTP server logging.
Max Log Entries	Sets the maximum number of HTTP server log entries. Only the last **Max Log Entries** are cached and viewable.
Log Format	Set the log format string for the HTTP server. Follow these **Log Format** rules: **%a** - remote IP address (could be a proxy) **%b** - bytes sent excluding headers **%B** - bytes sent excluding headers (0 = '-') **%h** - remote host (same as '%a') **%{h}i** - header contents from request (h = header string) **%m** - request method **%p** - ephemeral local port value used for request **%q** - query string (prepend with '?' or empty '-') **%t** - timestamp HH:MM:SS (same as Apache '%(%H:%M:%S)t' or '%(%T)t') **%u** - remote user (could be bogus for 401 status) **%U** - URL path info **%r** - first line of request (same as '%m %U%q <version>') **%s** - return status

3. Click **Submit.**

HTTP Authentication

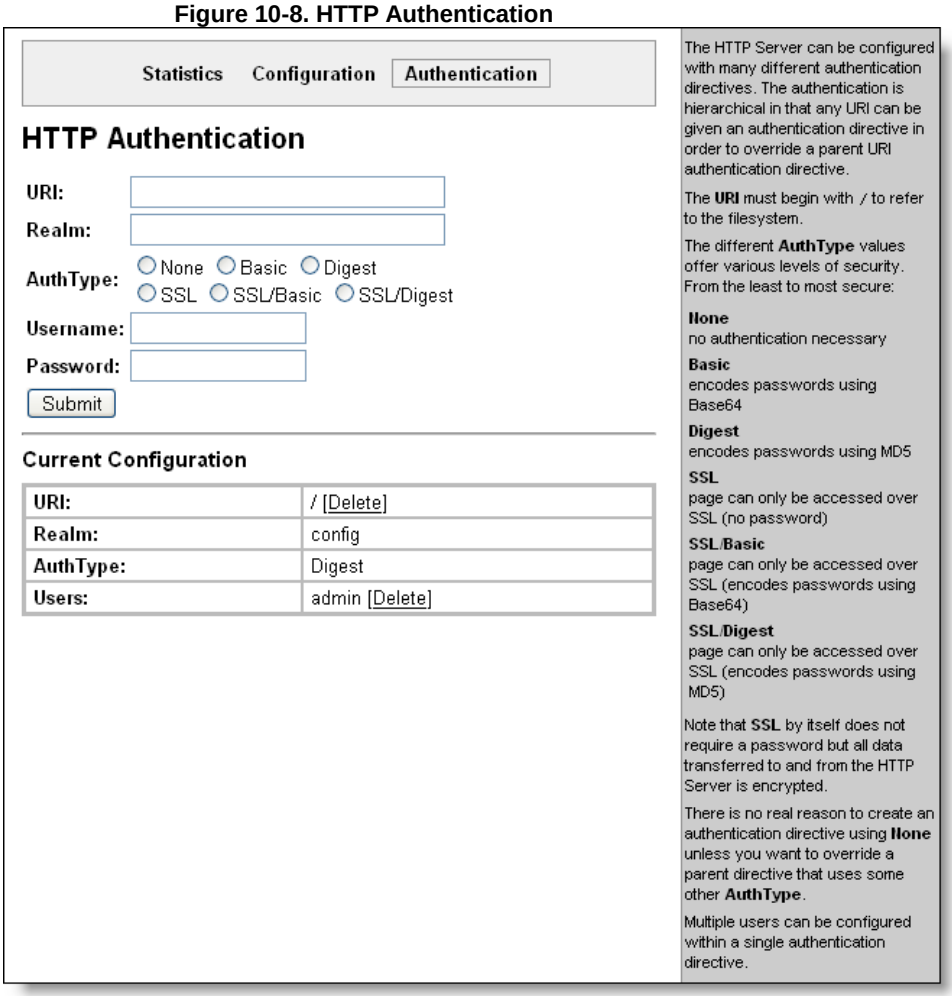
HTTP Authentication enables you to require usernames and passwords to access specific web pages or directories on the EDS's built-in web server.

- More than one Username per URI is permitted. Click **Submit** and enter the next Username as necessary.
- The URI, realm, username, and password are user-specified, free-form fields. The URI must match the directory created on the EDS file system.

Configure HTTP authentication settings:

1. Click **HTTP** on the menu bar then **Authentication** at the top of the page. The HTTP Authentication page opens.

Figure 10-8. HTTP Authentication



2. Enter or modify the following settings:

HTTP Authentication Settings	Description
URI	Enter the Uniform Resource Identifier (URI). The URI must begin with '/' to refer to the file system.
Realm	Enter the domain, or realm, used for HTTP. Required with the **URI** field.
Auth Type	Select the authentication type: **None** = no authentication is necessary. **Basic** = encodes passwords using Base64. **Digest** = encodes passwords using MD5. **SSL** = the page can only be accessed over SSL (no password is required). **SSL/Basic** = the page is accessible only over SSL and encodes passwords using Base64. **SSL/Digest** = the page is accessible only over SSL and encodes passwords using MD5.
Username	Enter the **Username** used to access the **URI**.
Password	Enter the **Password** for the **Username**.

3. Click **Submit.**

4. In the Current Configuration table, delete and clear the currently stored settings as necessary.

RSS Settings

EDS devices support RSS feeds with up-to-date information about configuration changes. RSS feeds allow you to view new information about changes made to the EDS over the web.

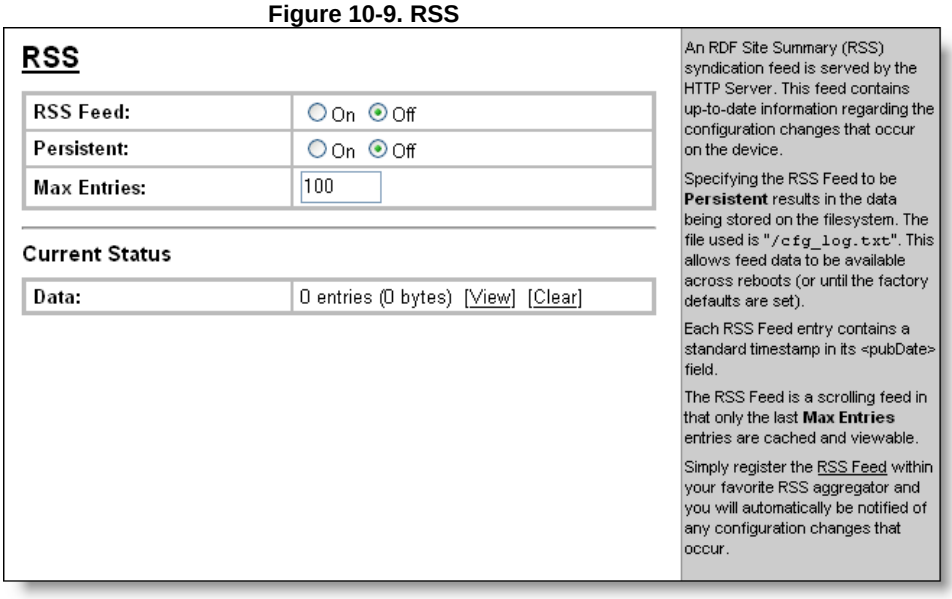
On the RSS Settings page, you can turn RSS feeds on or off. On means the device will create RSS feeds and make them accessible. RSS feeds may be viewed online or saved to the file system cfg_log.txt file.

***Tip**: To view the EDS RSS feed from your browser, enter the IP address of the device. You will be prompted whether you want to subscribe to the device RSS feed. Once you subscribe, you can view the RSS feed.*

Configure RSS settings:

1. Click **RSS** on the menu bar. The RSS page opens and shows the current RSS configuration.

Figure 10-9. RSS


RSS
RSS Feed: On Off
Persistent: On Off
Max Entries: 100
Current Status
Data: 0 entries (0 bytes) [View] [Clear]
An RDF Site Summary (RSS) syndication feed is served by the HTTP Server. This feed contains up-to-date information regarding the configuration changes that occur on the device.
Specifying the RSS Feed to be Persistent results in the data being stored on the filesystem. The file used is "/cfg_log.txt". This allows feed data to be available across reboots (or until the factory defaults are set).
Each RSS Feed entry contains a standard timestamp in its <pubDate> field.
The RSS Feed is a scrolling feed in that only the last Max Entries entries are cached and viewable.
Simply register the RSS Feed within your favorite RSS aggregator and you will automatically be notified of any configuration changes that occur.

2. Enter or modify the following settings:

RSS Page Settings	Description
RSS Feed	Select **On** to create RSS feeds.
Persistent	Select **On** to write the RSS feed to a file (cfg_log.txt) and to remain across reboots.
Max Entries	Sets the maximum number of log entries. Only the most recent number of **Max Entries** are cached and viewable.

3. Click **Submit.**

4. In the **Current Status** table, view and clear stored settings as necessary.

LPD Settings

In addition to its other functions, the EDS acts as a print server if a printer is connected to one of its serial ports.

Clicking the **LPD** (Line Printer Daemon) link in the menu bar, shows a LPD page. This page has three links at the top for viewing print queue statistics, changing print queue configuration, and printing a test page.

Because the LPD lines operate independently, you can specify different configuration settings for each.

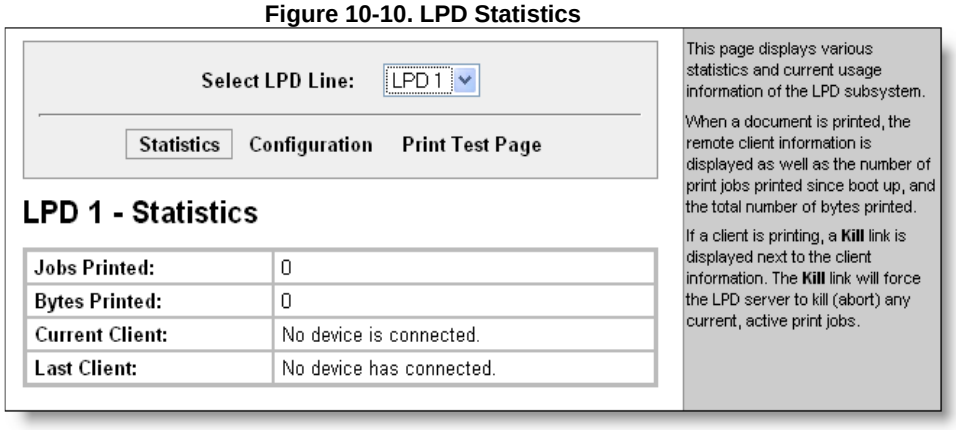
LPD Statistics Page

This read-only page shows various statistics about the LPD server.

View LPD statistics:

One Step Click **LPD** on the menu bar, then select the LPD line from the drop down list, and click **Statistics**. The LPD page shows the LPD statistics.

Figure 10-10. LPD Statistics


Select LPD Line:
LPD 1
Statistics
Configuration
Print Test Page
LPD 1 - Statistics
Jobs Printed: 0
Bytes Printed: 0
Current Client: No device is connected.
Last Client: No device has connected.
This page displays various statistics and current usage information of the LPD subsystem.
When a document is printed, the remote client information is displayed as well as the number of print jobs printed since boot up, and the total number of bytes printed.
If a client is printing, a Kill link is displayed next to the client information. The Kill link will force the LPD server to kill (abort) any current, active print jobs.

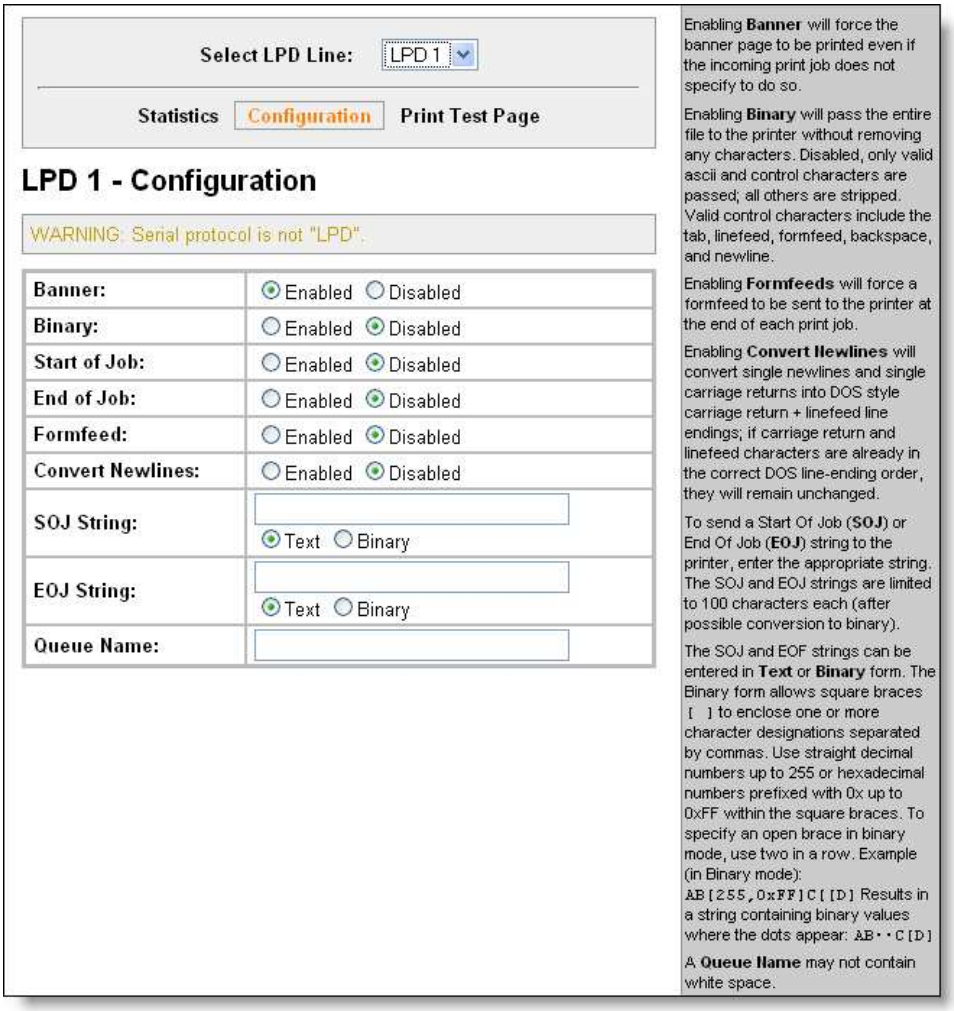
LPD Configuration Page

Here you can change LPD configuration settings.

Configure LPD settings:

1. Click **LPD** on the menu bar, select the LPD line and click **Configuration**. The LPD Configuration page appears.

Figure 10-11. LPD Configuration


Select LPD Line: LPD 1
Statistics
Configuration
Print Test Page
LPD 1 - Configuration
WARNING: Serial protocol is not "LPD".
Banner: Enabled Disabled
Binary: Enabled Disabled
Start of Job: Enabled Disabled
End of Job: Enabled Disabled
Formfeed: Enabled Disabled
Convert Newlines: Enabled Disabled
SOJ String: Text Binary
EOJ String: Text Binary
Queue Name:
Enabling Banner will force the banner page to be printed even if the incoming print job does not specify to do so.
Enabling Binary will pass the entire file to the printer without removing any characters. Disabled, only valid ascii and control characters are passed; all others are stripped. Valid control characters include the tab, linefeed, formfeed, backspace, and newline.
Enabling Formfeeds will force a formfeed to be sent to the printer at the end of each print job.
Enabling Convert Newlines will convert single newlines and single carriage returns into DOS style carriage return + linefeed line endings; if carriage return and linefeed characters are already in the correct DOS line-ending order, they will remain unchanged.
To send a Start Of Job (SOJ) or End Of Job (EOJ) string to the printer, enter the appropriate string. The SOJ and EOJ strings are limited to 100 characters each (after possible conversion to binary).
The SOJ and EOF strings can be entered in Text or Binary form. The Binary form allows square braces [ ] to enclose one or more character designations separated by commas. Use straight decimal numbers up to 255 or hexadecimal numbers prefixed with 0x up to 0xFF within the square braces. To specify an open brace in binary mode, use two in a row. Example (in Binary mode): AB[255,0xFF]C[[D] Results in a string containing binary values where the dots appear: AB··C[D]
A Queue Name may not contain white space.

2. Enter or modify the following settings:

LPD Configuration Page Settings	Description
Banner	Select **Enabled** to print the banner even if the print job does not specify to do so. Selected by default.
Binary	Select **Enabled** for the EDS to pass the entire file to the printer unchanged. Otherwise, the EDS passes only valid ASCII and valid control characters to the printer. Valid control characters include the tab, linefeed, formfeed, backspace, and newline characters. All others are stripped. Disabled by default.
Start of Job	Select **Enabled** to print a "start of job" string before sending the print data.
End of Job	Select **Enabled** to send an "end of job" string.
Formfeed	Select **Enabled** to force the printer to advance to the next page at the end of each print job.
Convert Newlines	Select **Enabled** to convert single newlines and carriage returns to DOS-style line endings.
SOJ String	If **Start of Job** (above) is enabled, enter the string to be sent to the printer at the beginning of a print job. The limit is 100 characters. Indicate whether the string is in text or binary format.
EOJ String	If **End of Job** (above) is enabled, enter the string to send at the end of a print job. The limit is 100 characters. Indicate whether the string is in text or binary format.
Queue Name	To change the name of the print queue, enter a new name. The name cannot have white space in it and is limited to 31 characters. The default is **LPDQueueX (for line number X)**

11: Security Settings

SSH and SSL are protocols for managing the security of data transmissions over the Internet.

SSH Settings

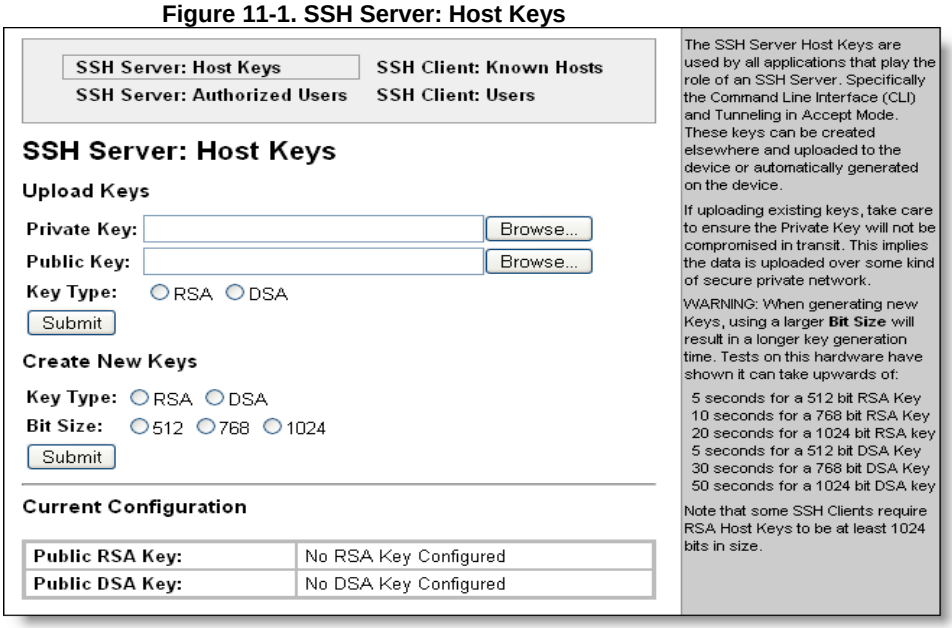
Secure Shell (SSH) is a protocol used to access a remote computer over an encrypted channel. It is a protocol for managing the security of data transmission over the Internet. It provides encryption, authentication, and message integrity services. This page has four links at the top for viewing and changing SSH server host keys, SSH server authorized keys, SSH client known hosts, and SSH client users.

SSH Server Host Keys

Configure the SSH server host keys:

1. Click **SSH** on the menu bar. The SSH Server: Host Keys page appears.

Figure 11-1. SSH Server: Host Keys


SSH Server: Host Keys
SSH Client: Known Hosts
SSH Server: Authorized Users
SSH Client: Users
SSH Server: Host Keys
Upload Keys
Private Key:
Browse...
Public Key:
Browse...
Key Type: RSA DSA
Submit
Create New Keys
Key Type: RSA DSA
Bit Size: 512 768 1024
Submit
Current Configuration
Public RSA Key: No RSA Key Configured
Public DSA Key: No DSA Key Configured
The SSH Server Host Keys are used by all applications that play the role of an SSH Server. Specifically the Command Line Interface (CLI) and Tunneling in Accept Mode. These keys can be created elsewhere and uploaded to the device or automatically generated on the device.
If uploading existing keys, take care to ensure the Private Key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.
WARNING: When generating new Keys, using a larger Bit Size will result in a longer key generation time. Tests on this hardware have shown it can take upwards of:
5 seconds for a 512 bit RSA Key
10 seconds for a 768 bit RSA Key
20 seconds for a 1024 bit RSA key
5 seconds for a 512 bit DSA Key
30 seconds for a 768 bit DSA Key
50 seconds for a 1024 bit DSA key
Note that some SSH Clients require RSA Host Keys to be at least 1024 bits in size.

3. Enter or modify the following settings:

SSH Server: Host Keys	Description
Upload Keys	
Private	Enter the path and name of the existing private key you want to

SSH Server: Host Keys	Description
Key	upload or use the **Browse** button to select the key. Be sure the private key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.
Public Key	Enter the path and name of the existing public key you want to upload or use the **Browse** button to select the key.
Key Type	Select a key type to use: **RSA** = use this key with SSH1 and SSH2 protocols. **DSA** = use this key with the SSH2 protocol.
Create New Keys	
Key Type	Select a key type to use for the new key: **RSA** = use this key with the SSH1 and SSH2 protocols. **DSA** = use this key with the SSH2 protocol.
Bit Size	Select a bit length for the new key: **512** **768** **1024** Using a larger bit size takes more time to generate the key. Approximate times are: 10 seconds for a 512 bit RSA Key 15 seconds for a 768 bit RSA Key 1 minute for a 1024 bit RSA key 30 seconds for a 512 bit DSA key 1 minute for a 768 bit DSA key 2 minutes for a 1024 bit DSA key Some SSH clients require RSA host keys to be at least 1024 bits long. ***Note:*** *EDS4100 generates keys up to 1024 bits long. It can work with larger keys (up to 2048 bit) if they are imported or otherwise created.*

4. Click **Submit.**

SSH Server Authorized Users

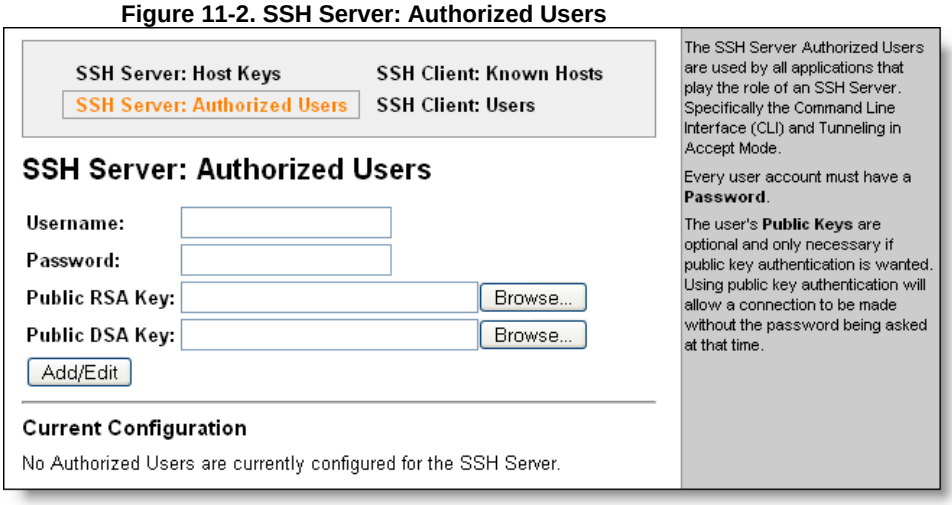
On the SSH Server page you can change SSH server settings for Authorized Users.

- SSH Server Authorized Users are accounts on the EDS that can be used to log into the EDS using SSH.
- For instance, these accounts can be used to SSH into the CLI or open an SSH connection to a device port.
- Every account must have a password.
- The users' public keys are optional and only necessary if public key authentication is required. Using public key authentication allows a connection to be made without the password prompt.
- Under Current Configuration, User has a Delete User link, and Public RSA Key and Public DSA Key have View Key and Delete Key links.

Configure the SSH server for authorized users:

1. Click **SSH** on the menu bar and then **Server Authorized Users** at the top of the page. The SSH Server: Authorized Users page appears.

Figure 11-2. SSH Server: Authorized Users


SSH Server: Host Keys
SSH Client: Known Hosts
SSH Server: Authorized Users
SSH Client: Users
SSH Server: Authorized Users
Username:
Password:
Public RSA Key:
Browse...
Public DSA Key:
Browse...
Add/Edit
Current Configuration
No Authorized Users are currently configured for the SSH Server.
The SSH Server Authorized Users are used by all applications that play the role of an SSH Server. Specifically the Command Line Interface (CLI) and Tunneling in Accept Mode.
Every user account must have a Password.
The user's Public Keys are optional and only necessary if public key authentication is wanted. Using public key authentication will allow a connection to be made without the password being asked at that time.

2. Enter or modify the following settings:

SSH Server: Authorized Users Page Settings	Description
Username	Enter the name of the user authorized to access the SSH server.
Password	Enter the password associated with the username.
Public RSA Key	Enter the path and name of the existing public RSA key you want to use with this user or use the **Browse** button to select the key. If authentication is successful with the key, no password is required.
Public DSA Key	Enter the path and name of the existing public DSA key

SSH Server: Authorized Users Page Settings	Description
	you want to use with this user or use the **Browse** button to select the key. If authentication is successful with the key, no password is required.

3. Click **Submit.**

SSH Client Known Hosts

On this page you can change SSH client settings for known hosts.

***Note**: You do not have to complete the fields on this page for communication to occur. However, completing them adds another layer of security that protects against Man-In-The-Middle (MITM) attacks.*

Configure the SSH client for known hosts:

1. Click **SSH** on the menu bar and then **Client Known Hosts** at the top of the page. The SSH Client: Known Hosts page appears.

Figure 11-3. SSH Client: Known Hosts

SSH Server: Host Keys
SSH Client: Known Hosts
SSH Server: Authorized Users
SSH Client: Users
SSH Client: Known Hosts
Server:
Public RSA Key:
Browse...
Public DSA Key:
Browse...
Submit
Current Configuration
No Known Hosts are currently configured for the SSH Client.
The SSH Client Known Hosts are used by all applications that play the role of an SSH Client. Specifically Tunneling in Connect Mode. Configuring these public keys are optional but if they exist another layer of security is offered which helps prevent Man-in-the-Middle (MITM) attacks.
Specify either a DNS Hostname or IP Address when adding public host keys for a Server. This Server name should match the name used as the Remote Address in Connect Mode Tunneling.

2. Enter or modify the following settings:

SSH Client: Known Hosts	Description
Server	Enter the name or IP address of a known host. If you enter a server name, the name should match the name of the server used as the **Remote Address** in Connect mode tunneling.
Public RSA Key	Enter the path and name of the existing public RSA key you want to use with this known host or use the **Browse** button to select the key.
Public DSA Key	Enter the path and name of the existing public DSA key you want to use with this known host or use the **Browse** button to select the key.

***Note**: These settings are not required for communication. They protect against Man-In-The-Middle (MITM) attacks.*

3. Click **Submit.**

4. In the **Current Configuration** table, delete currently stored settings as necessary.

SSH Client User Configuration

On this page you can change SSH client settings for users.

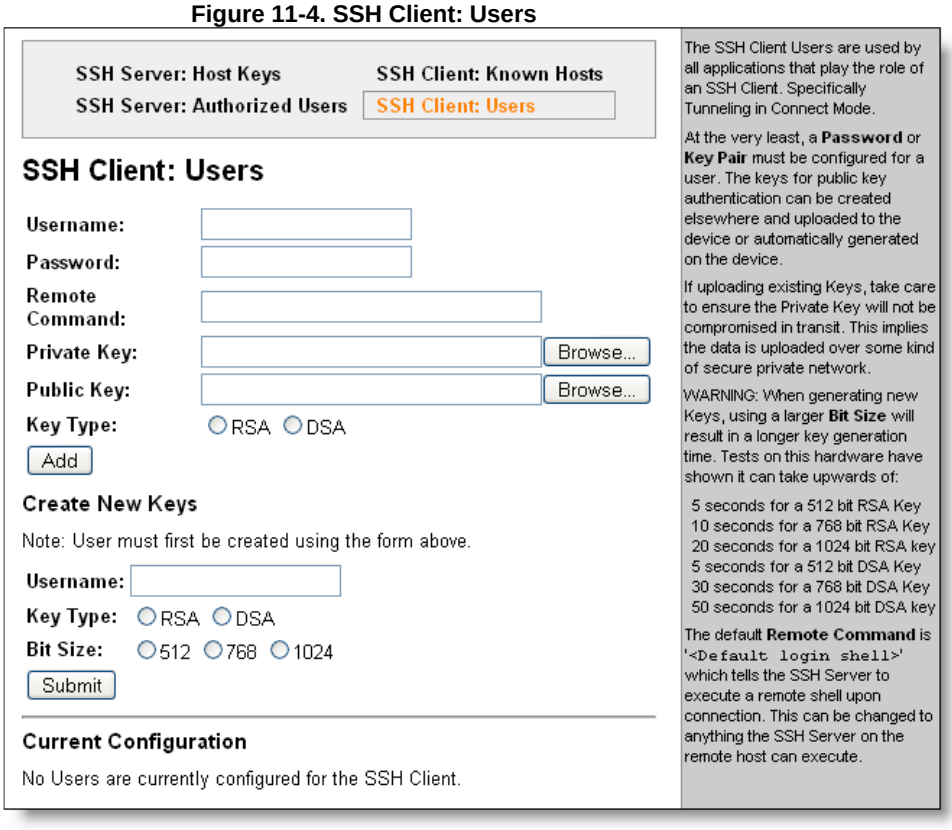
SSH client known users are used by all applications that play the role of an SSH client, specifically tunneling in Connect Mode. At the very least, a password or key pair must be configured for a user. The keys for public key authentication can be created elsewhere and uploaded to the device or automatically generated on the device. If uploading existing keys, be sure the private key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.

***Note**: If you are providing a key by uploading a file, make sure that the key is not password protected.*

Configure the SSH client users:

1. Click **SSH** on the menu bar and then **SSH Client Users** at the top of the page. The SSH Client: Users page appears.

Figure 11-4. SSH Client: Users


SSH Server: Host Keys
SSH Client: Known Hosts
SSH Server: Authorized Users
SSH Client: Users
SSH Client: Users
Username:
Password:
Remote Command:
Private Key:
Browse...
Public Key:
Browse...
Key Type:
RSA DSA
Add
Create New Keys
Note: User must first be created using the form above.
Username:
Key Type:
RSA DSA
Bit Size:
512 768 1024
Submit
Current Configuration
No Users are currently configured for the SSH Client.
The SSH Client Users are used by all applications that play the role of an SSH Client. Specifically Tunneling in Connect Mode.
At the very least, a Password or Key Pair must be configured for a user. The keys for public key authentication can be created elsewhere and uploaded to the device or automatically generated on the device.
If uploading existing Keys, take care to ensure the Private Key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.
WARNING: When generating new Keys, using a larger Bit Size will result in a longer key generation time. Tests on this hardware have shown it can take upwards of:
5 seconds for a 512 bit RSA Key
10 seconds for a 768 bit RSA Key
20 seconds for a 1024 bit RSA key
5 seconds for a 512 bit DSA Key
30 seconds for a 768 bit DSA Key
50 seconds for a 1024 bit DSA key
The default Remote Command is '<Default login shell>' which tells the SSH Server to execute a remote shell upon connection. This can be changed to anything the SSH Server on the remote host can execute.

2. Enter or modify the following settings:

SSH Client: Users Page Settings	Description
Username	Enter the name that the EDS uses to connect to a SSH server.
Password	Enter the password associated with the username.
Remote Command	Enter the command that can be executed remotely. Default is **shell**, which tells the SSH server to execute a remote shell upon connection. This command can be changed to anything the remote host can perform.
Private Key	Enter the name of the existing private key you want to use with this SSH client user. You can either enter the path and name of the key, or use the **Browse** button to select the key.
Public Key	Enter the path and name of the existing public key you want to use with this SSH client user or use the **Browse** button to select the key.
Key Type	Select the key type to be used. Choices are: **RSA** = use this key with the SSH1 and SSH2 protocols. **DSA** = use this key with the SSH2 protocol.
Create New Keys	
Username	Enter the name of the user associated with the new key.
Key Type	Select the key type to be used for the new key. Choices are: **RSA** = use this key with the SSH1 and SSH2 protocols. **DSA** = use this key with the SSH2 protocol.
Bit Size	Select the bit length of the new key: **512** **768** **1024** Using a larger Bit Size takes more time to generate the key. Approximate times are: 10 seconds for a 512 bit RSA Key 15 seconds for a 768 bit RSA Key 1 minute for a 1024 bit RSA key 30 seconds for a 512 bit DSA key 1 minute for a 768 bit DSA key 2 minutes for a 1024 bit DSA key Some SSH clients require RSA host keys to be at least 1024 bits long.

3. Click **Submit.**

4. In the **Current Configuration** table, delete currently stored settings as necessary.

SSL Settings

Secure Sockets Layer (SSL) is a protocol for managing the security of data transmission over the Internet. It provides encryption, authentication, and message integrity services. SSL is widely used for secure communication to a web server.

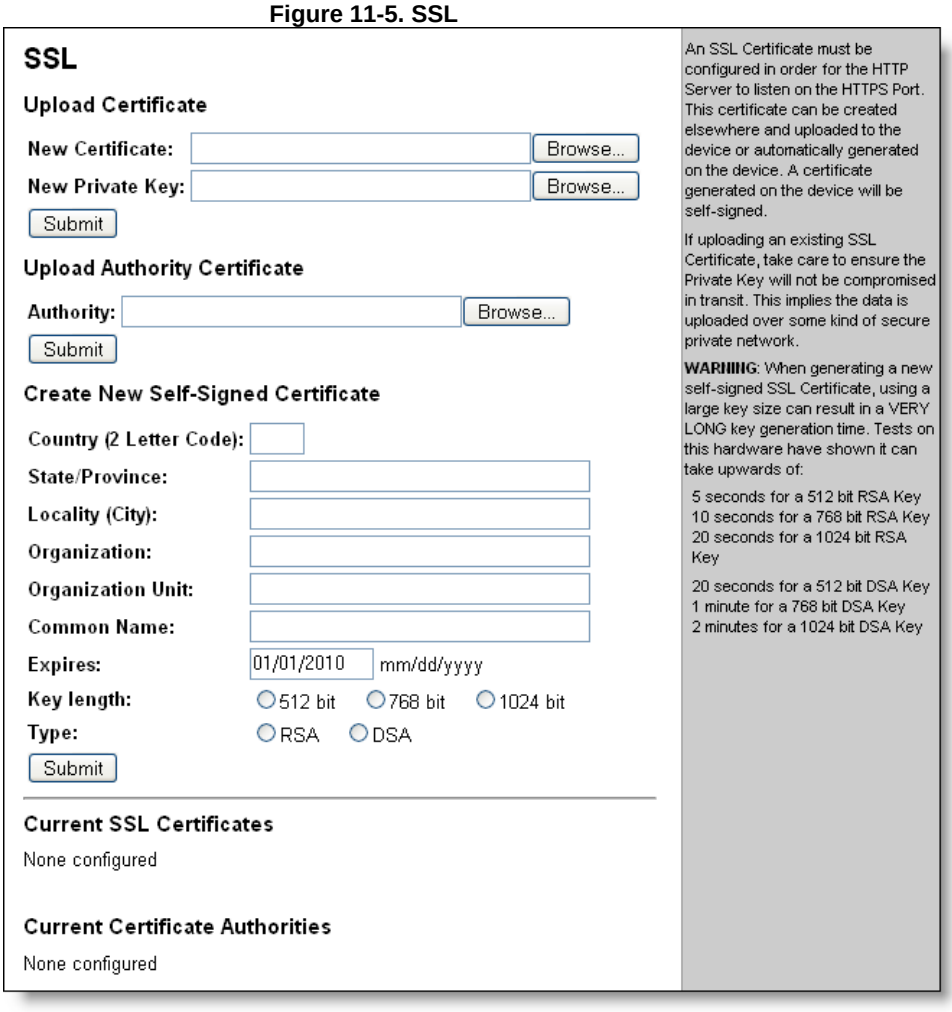
Certificate/Private key combinations can be obtained from an external Certificate Authority (CA) and downloaded into the unit. Self-signed certificates with associated private key can be generated by the device server itself.

For more information regarding Certificates and how to obtain them see *Obtaining a Certificate and Private Key on page 146*.

Configure the EDS SSL settings:

1. Click **SSL** from the main menu. The SSL page appears.

Figure 11-5. SSL


SSL
Upload Certificate
New Certificate:
Browse...
New Private Key:
Browse...
Submit
Upload Authority Certificate
Authority:
Browse...
Submit
Create New Self-Signed Certificate
Country (2 Letter Code):
State/Province:
Locality (City):
Organization:
Organization Unit:
Common Name:
Expires:
01/01/2010
mm/dd/yyyy
Key length:
512 bit
768 bit
1024 bit
Type:
RSA
DSA
Submit
Current SSL Certificates
None configured
Current Certificate Authorities
None configured
An SSL Certificate must be configured in order for the HTTP Server to listen on the HTTPS Port. This certificate can be created elsewhere and uploaded to the device or automatically generated on the device. A certificate generated on the device will be self-signed.
If uploading an existing SSL Certificate, take care to ensure the Private Key will not be compromised in transit. This implies the data is uploaded over some kind of secure private network.
WARNING: When generating a new self-signed SSL Certificate, using a large key size can result in a VERY LONG key generation time. Tests on this hardware have shown it can take upwards of:
5 seconds for a 512 bit RSA Key
10 seconds for a 768 bit RSA Key
20 seconds for a 1024 bit RSA Key
20 seconds for a 512 bit DSA Key
1 minute for a 768 bit DSA Key
2 minutes for a 1024 bit DSA Key

2. Enter or modify the following settings:

SSL Page Settings	Description
Upload Certificate	
New Certificate	This certificate identifies the EDS to peers. It is used for HTTPS and SSL Tunneling. Enter the path and name of the certificate you want to upload, or use the **Browse** button to select the certificate. **RSA** or **DSA** certificates with 512 to 1024 bit public keys are allowed. The format of the file must be **PEM**. The file must start with "-----BEGIN CERTIFICATE-----" and end with "-----END CERTIFICATE-----". Some Certificate Authorities add comments before and/or after these lines. Those need to be deleted before upload.
New Private Key	Enter the path and name of the private key you want to upload, or use the **Browse** button to select the private key. The key needs to belong to the certificate entered above. The format of the file must be **PEM**. The file must start with "-----BEGIN RSA PRIVATE KEY-----" and end with "-----END RSA PRIVATE KEY-----". Read **DSA** instead of **RSA** in case of a **DSA** key. Some Certificate Authorities add comments before and/or after these lines. Those need to be deleted before upload.
Upload Authority Certificate	
Authority	One or more authority certificates are needed to verify a peer's identity. It is used for SSL Tunneling. These certificates do not require a private key. Enter the path and name of the certificate you want to upload, or use the **Browse** button to select the certificate. **RSA** or **DSA** certificates with 512 to 1024 bit public keys are allowed. The format of the file must be **PEM**. The file must start with "-----BEGIN CERTIFICATE-----" and end with "-----END CERTIFICATE-----". Some Certificate Authorities add comments before and/or after these lines. Those need to be deleted before upload.
Create New Self-Signed Certificate	
Country (2 Letter Code)	Enter the 2-letter country code to be assigned to the new self-signed certificate. **Examples:** US for United States and CA for Canada

SSL Page Settings	Description
State/Province	Enter the state or province to be assigned to the new self-signed certificate.
Locality (City)	Enter the city or locality to be assigned to the new self-signed certificate.
Organization	Enter the organization to be associated with the new self-signed certificate. **Example:** If your company is called Widgets, and you are setting up a web server for the Sales department, enter Widgets for the organization.
Organization Unit	Enter the organizational unit to be associated with the new self-signed certificate. **Example:** If your company is setting up a web server for the Sales department, enter Sales for your organizational unit.
Common Name	Enter the same name that the user will enter when requesting your web site. **Example:** If a user enters http://www.widgets.abccompany.com to access your web site, the **Common Name** would be www.widgets.abccompany.com.
Expires	Enter the expiration date, in mm/dd/yyyy format, for the new self-signed certificate. **Example:** An expiration date of May 9, 2010 is entered as 05/09/2010.
Key length	Select the bit size of the new self-signed certificate. Choices are: **512 bits** **768 bits** **1024 bits** The larger the bit size, the longer it takes to generate the key. Approximate times are: 10 seconds for a 512-bit RSA key 15 seconds for a 768-bit RSA key 1 minute for a 1024-bit RSA key 30 seconds for a 512-bit DSA key 2 minutes for a 768-bit DSA key 6 minute for a 1024-bit DSA key
Type	Select the type of key: **RSA** = Public-Key Cryptography algorithm based on large prime numbers, invented by Rivest Shamir and Adleman. Used for encryption and signing.

SSL Page Settings	Description
	DSA = Digital Signature Algorithm also based on large prime numbers, but can only be used for signing. Developed by the US government to avoid the patents on RSA.

12: Maintenance and Diagnostics Settings

This chapter describes how you can

- View current file diagnostics or modify files.
- Configure the EDS network stack protocols.
- Specify the hosts and subnets permitted to communicate with the EDS.
- Configure automatic discovery of the device by the DeviceInstaller utility.
- View or change the current date or time.
- Configure the EDS system settings.
- And how you can use several other tools for diagnostics and statistics.

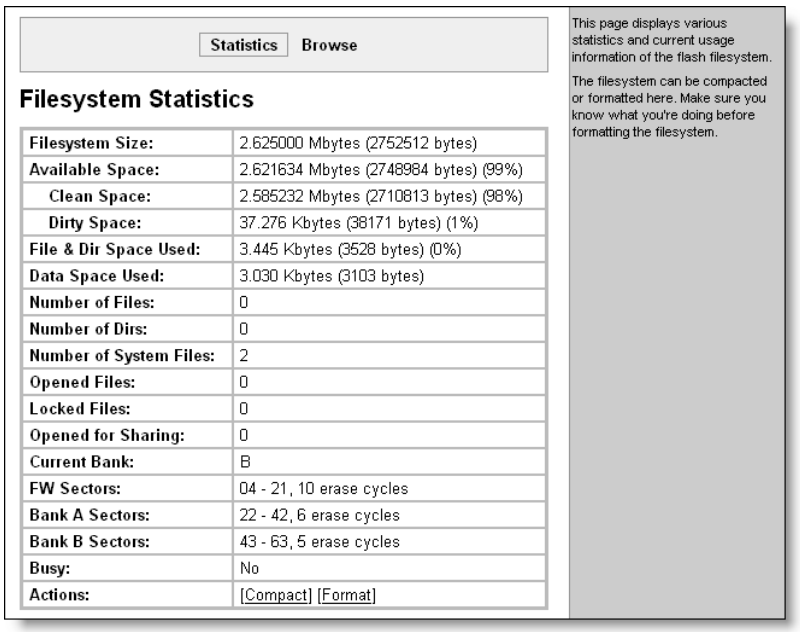
File System Configuration

The EDS uses a flash file system to store files. Use the Filesystem option to view current file diagnostics or modify files.

File System Statistics

This page shows various statistics and current usage information of the flash file system.

Figure 12-1. File system Statistics


Statistics
Browse
Filesystem Statistics
Filesystem Size: 2.625000 Mbytes (2752512 bytes)
Available Space: 2.621634 Mbytes (2748984 bytes) (99%)
Clean Space: 2.585232 Mbytes (2710813 bytes) (98%)
Dirty Space: 37.276 Kbytes (38171 bytes) (1%)
File & Dir Space Used: 3.445 Kbytes (3528 bytes) (0%)
Data Space Used: 3.030 Kbytes (3103 bytes)
Number of Files: 0
Number of Dirs: 0
Number of System Files: 2
Opened Files: 0
Locked Files: 0
Opened for Sharing: 0
Current Bank: B
FW Sectors: 04 - 21, 10 erase cycles
Bank A Sectors: 22 - 42, 6 erase cycles
Bank B Sectors: 43 - 63, 5 erase cycles
Busy: No
Actions: [Compact] [Format]
This page displays various statistics and current usage information of the flash filesystem.
The filesystem can be compacted or formatted here. Make sure you know what you're doing before formatting the filesystem.

To view file system statistics, compact, or format the EDS file system:

1. Back up all files as necessary.

2. Click **Filesystem** on the menu bar. The File system page opens and shows the current file system statistics and usage.

3. To compact the files, click **Compact**.

CAUTION: In the next step, all files and configuration settings on the file system are destroyed upon formatting. Back up all files as necessary. Upon formatting, the current configuration is retained.

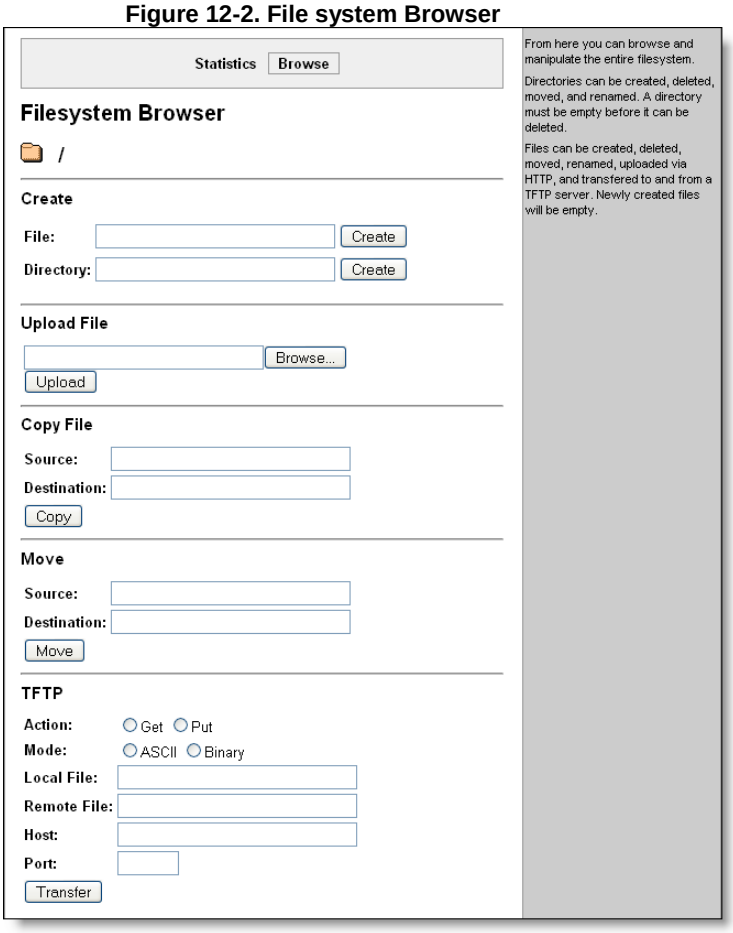
4. To reformat the file system, click **Format**.

File System Browser

Browse the EDS file system:

1. Click **Filesystem** on the menu bar and then **Browse** at the top of the page. The File system Browser page opens and shows the current file system configuration.

Figure 12-2. File system Browser



2. Click a filename to view the contents.

3. Click the **X** next to a filename to delete the file or directory. You can only delete a directory if it is empty.

4. Enter or modify the following settings:

Note: *Changes apply to the current directory view. To make changes within other folders, click the folder or directory and then enter the parameters in the settings listed below.*

File system Browser Page Settings	Description
Create	
File	Enter the name of the file you want to create, and then click **Create**.
Directory	Enter the name of the directory you want to create, and then click **Create**.
Upload File	Enter the path and name of the file you want to upload by means of HTTP(S) or use the **Browse** button to select the file, and then click **Upload**.
Copy File	
Source	Enter the location where the file you want to copy resides.
Destination	Enter the location where you want the file copied. After you specify a source and destination, click **Copy** to copy the file.
Move	
Source	Enter the location where the file you want to move resides.
Destination	Enter the location where you want the file moved. After you specify a source and destination, click **Move** to move the file.
TFTP	
Action	Select the action that is to be performed via TFTP: **Get** = a “get” command will be executed to store a file locally. **Put** = a “put” command will be executed to send a file to a remote location.
Mode	Select a TFTP mode to use. Choices are: **ASCII** **Binary**
Local File	Enter the name of the local file on which the specified “get” or “put” action is to be performed.
Remote File	Enter the name of the file at the remote location that is to be stored locally (“get’) or externally (“put”).
Host	Enter the IP address or name of the host involved in this operation.

File system Browser Page Settings	Description
Port	Enter the number of the port involved in TFTP operations. Click **Transfer** to perform the TFTP transfer.

Protocol Stack Configuration

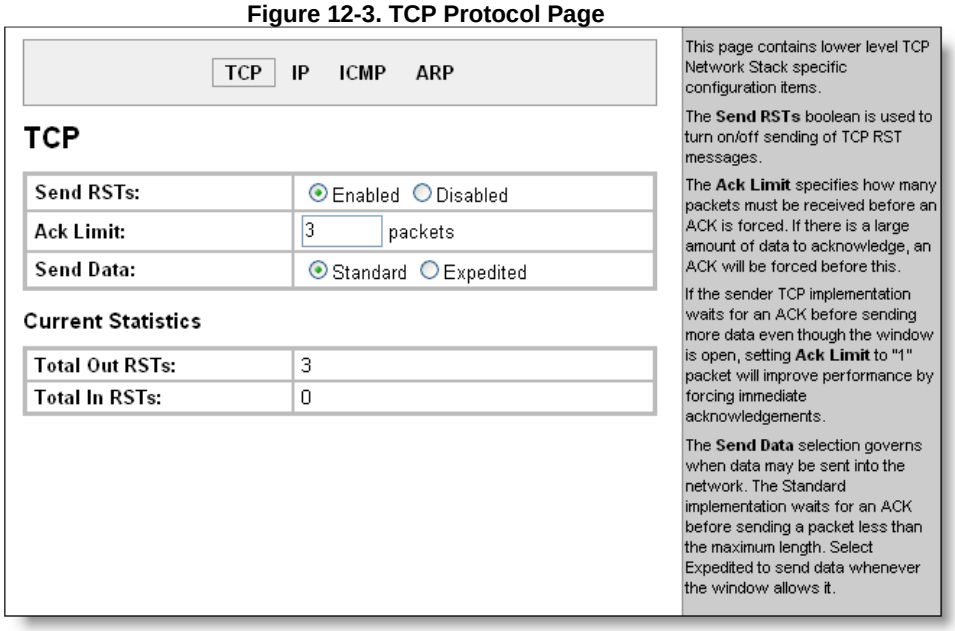
Configure the EDS network stack protocols:

1. Click **Protocol Stack** on the menu bar. The Protocol page appears with links to the TCP, IP, ICMP, and ARP protocols.

2. Click on one of the protocol names to see the details of the settings for that protocol.

TCP Settings

Figure 12-3. TCP Protocol Page


TCP
IP
ICMP
ARP
TCP
Send RSTs:
Enabled
Disabled
Ack Limit:
3
packets
Send Data:
Standard
Expedited
Current Statistics
Total Out RSTs:
3
Total In RSTs:
0
This page contains lower level TCP Network Stack specific configuration items.
The Send RSTs boolean is used to turn on/off sending of TCP RST messages.
The Ack Limit specifies how many packets must be received before an ACK is forced. If there is a large amount of data to acknowledge, an ACK will be forced before this.
If the sender TCP implementation waits for an ACK before sending more data even though the window is open, setting Ack Limit to "1" packet will improve performance by forcing immediate acknowledgements.
The Send Data selection governs when data may be sent into the network. The Standard implementation waits for an ACK before sending a packet less than the maximum length. Select Expedited to send data whenever the window allows it.

On the TCP page, you may modify the following settings:

- Send RSTs:

  TCP contains six control bits, with one or more defined in each packet. RST is one of the control bits. The RST bit is responsible for telling the receiving TCP stack to end a connection immediately.

***CAUTION**: Setting this flag may pose a security risk.*

One Step Select **Enabled** to enable the sending of the RST flag.

One Step Select **Disabled** to disable the sending of the RST flag.

- Ack Limit:

  The Ack Limit specifies how many packets must be received before an ACK is forced. If there is a large amount of data to acknowledge, an ACK will be forced before this.

  If the sender TCP implementation waits for an ACK before sending more data even though the window is open, setting Ack Limit to "1" packet will improve performance by forcing immediate acknowledgements.

- Send **Data:**

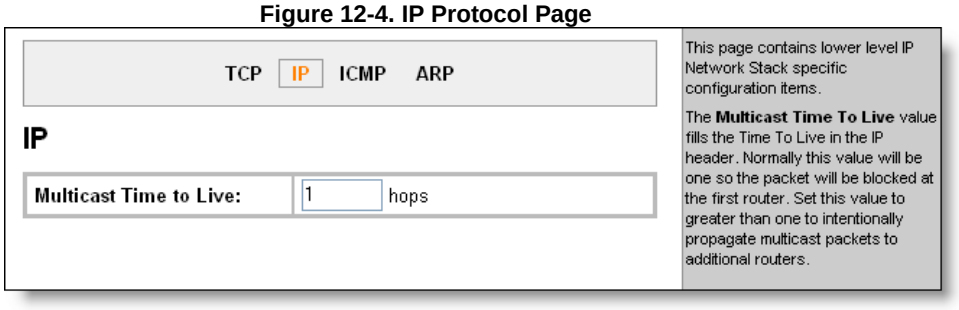
  The Send Data selection governs when data may be sent into the network. The Standard implementation waits for an ACK before sending a packet less than the maximum length.

One Step Select **Expedited** to send data whenever the window allows it.

IP Setting

On the TCP page, you modify the Multicast Time to Live limit. The limit is the number of hops a packet may make before it is terminated

Figure 12-4. IP Protocol Page

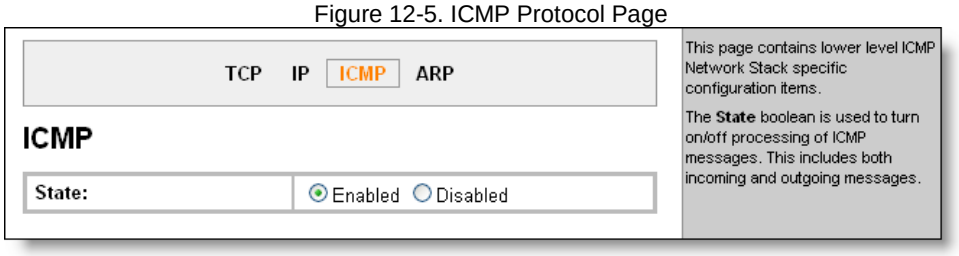

TCP
IP
ICMP
ARP
IP
Multicast Time to Live:
1
hops
This page contains lower level IP Network Stack specific configuration items.
The Multicast Time To Live value fills the Time To Live in the IP header. Normally this value will be one so the packet will be blocked at the first router. Set this value to greater than one to intentionally propagate multicast packets to additional routers.

One Step On the IP Protocol page, enter the number of hops a transmitted multicast packet may make before it is terminated.

ICMP Settings

On the ICMP page, you set enabled or disabled.

Figure 12-5. ICMP Protocol Page

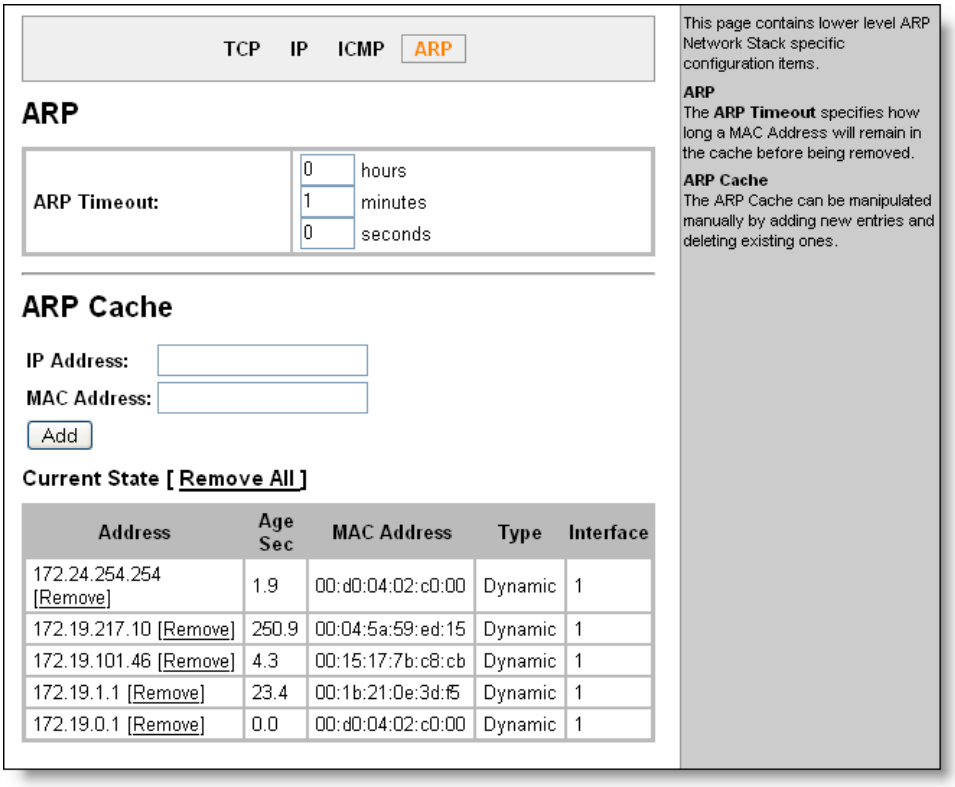


One Step Choose **Enabled** or **Disabled**.

ARP Settings

On the ARP page, you set the maximum time an address remains in the cache, and you specify both the IP and MAC addresses for the ARP cache. Both addresses are required.

Figure 12-6. ARP Protocol Page


TCP IP ICMP ARP
ARP
ARP Timeout:
0 hours
1 minutes
0 seconds
ARP Cache
IP Address:
MAC Address:
Add
Current State [Remove All]
Address
Age Sec
MAC Address
Type
Interface
172.24.254.254 [Remove] 1.9 00:d0:04:02:c0:00 Dynamic 1
172.19.217.10 [Remove] 250.9 00:04:5a:59:ed:15 Dynamic 1
172.19.101.46 [Remove] 4.3 00:15:17:7b:c8:cb Dynamic 1
172.19.1.1 [Remove] 23.4 00:1b:21:0e:3d:f5 Dynamic 1
172.19.0.1 [Remove] 0.0 00:d0:04:02:c0:00 Dynamic 1
This page contains lower level ARP Network Stack specific configuration items.
ARP
The ARP Timeout specifies how long a MAC Address will remain in the cache before being removed.
ARP Cache
The ARP Cache can be manipulated manually by adding new entries and deleting existing ones.

1. Enter the time, in hours, minutes and seconds, for the timeout.
2. Enter the IP address to add to the ARP cache.
3. Enter the MAC address to add to the ARP cache.
4. Click **Add** after supplying both fields.

One Step Under Current State, select **Remove All** to remove all entries in the ARP cache, or select **Remove** to remove a specific entry from the ARP cache.

IP Address Filter

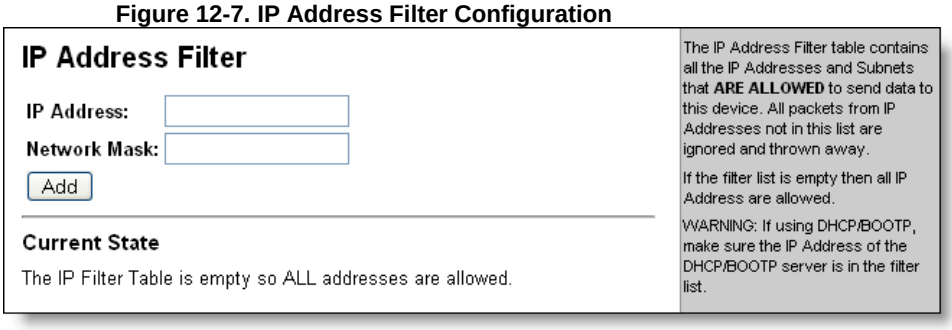
The IP address filter specifies the hosts and subnets permitted to communicate with the EDS.

***Note**: If using DHCP/BOOTP, ensure the DHCP/BOOTP server is in this list.*

Configure the IP address filter:

1. Click **IP Address Filter** on the menu bar. The IP Address Filter page opens to display the current configuration.

Figure 12-7. IP Address Filter Configuration


IP Address Filter
IP Address:
Network Mask:
Add
Current State
The IP Filter Table is empty so ALL addresses are allowed.
The IP Address Filter table contains all the IP Addresses and Subnets that ARE ALLOWED to send data to this device. All packets from IP Addresses not in this list are ignored and thrown away.
If the filter list is empty then all IP Address are allowed.
WARNING: If using DHCP/BOOTP, make sure the IP Address of the DHCP/BOOTP server is in the filter list.

2. Enter or modify the following settings:

IP Address Filter Page Settings	Description
IP Address	Enter the IP address to add to the IP filter table.
Network Mask	Enter the IP address' network mask in dotted notation.

3. In the **Current State** table, click **Remove** to delete settings as necessary.

4. Click **Submit.**

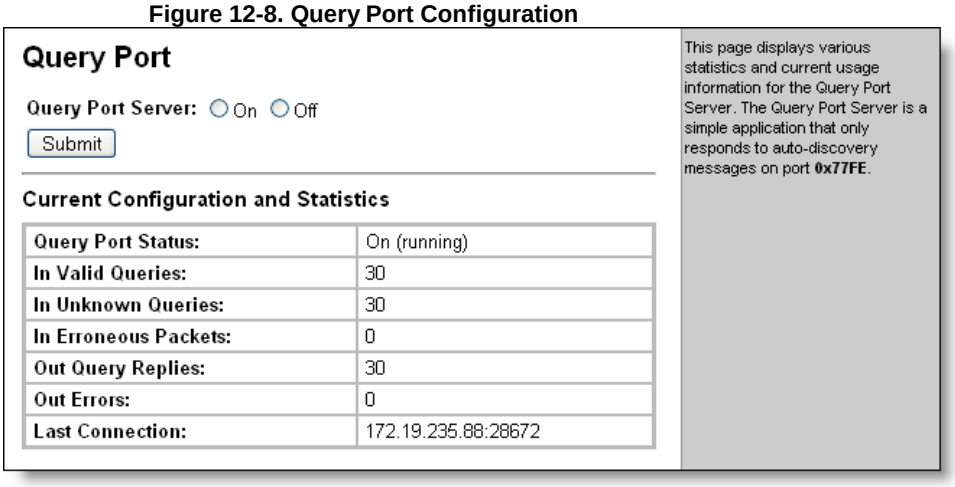
Query Port

The query port is used for the automatic discovery of the device by the DeviceInstaller utility. Only 0x77FE discover messages from DeviceInstaller are supported. For more information on DeviceInstaller, see Using DeviceInstaller on page 38.

Configure the query port server:

1. Click **Query Port** on the menu bar. The Query Port page opens to display the current configuration.

Figure 12-8. Query Port Configuration


Query Port
Query Port Server: On Off
Submit
Current Configuration and Statistics
Query Port Status: On (running)
In Valid Queries: 30
In Unknown Queries: 30
In Erroneous Packets: 0
Out Query Replies: 30
Out Errors: 0
Last Connection: 172.19.235.88:28672
This page displays various statistics and current usage information for the Query Port Server. The Query Port Server is a simple application that only responds to auto-discovery messages on port 0x77FE.

2. Select **On** to enable the Query Port server.

3. Click **Submit.**

Diagnostics

The EDS has several tools for diagnostics and statistics. The options at the top of the page allow for the configuration or viewing of MIB2 statistics, IP socket information, ping, traceroute, DNS lookup, memory, buffer pools, processes, and hardware.

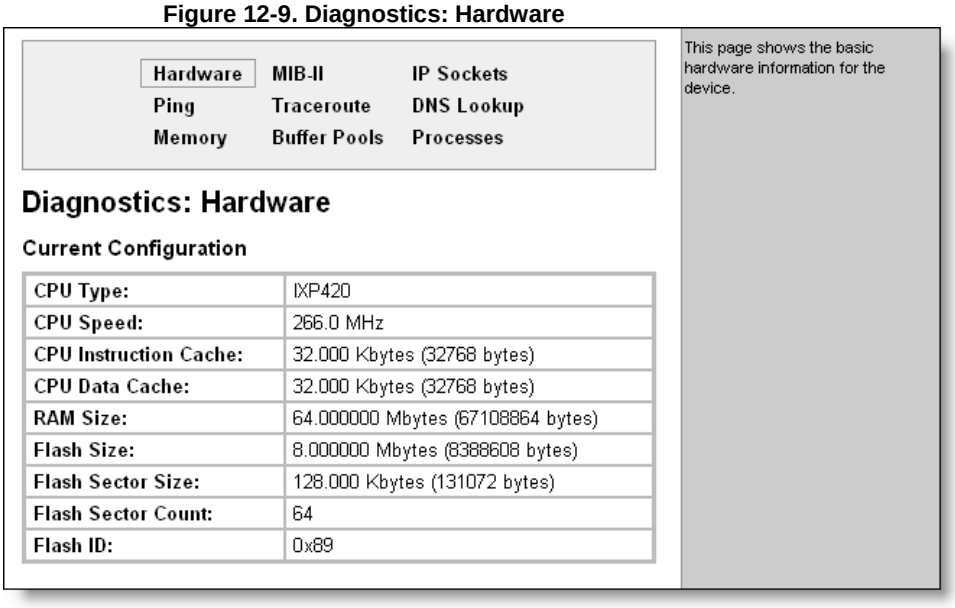
Hardware

This read-only page shows the current hardware configuration.

Display the EDS hardware diagnostics:

One Step Click **Diagnostics** on the menu bar. The Diagnostics: Hardware page opens and shows the current hardware configuration.

Figure 12-9. Diagnostics: Hardware



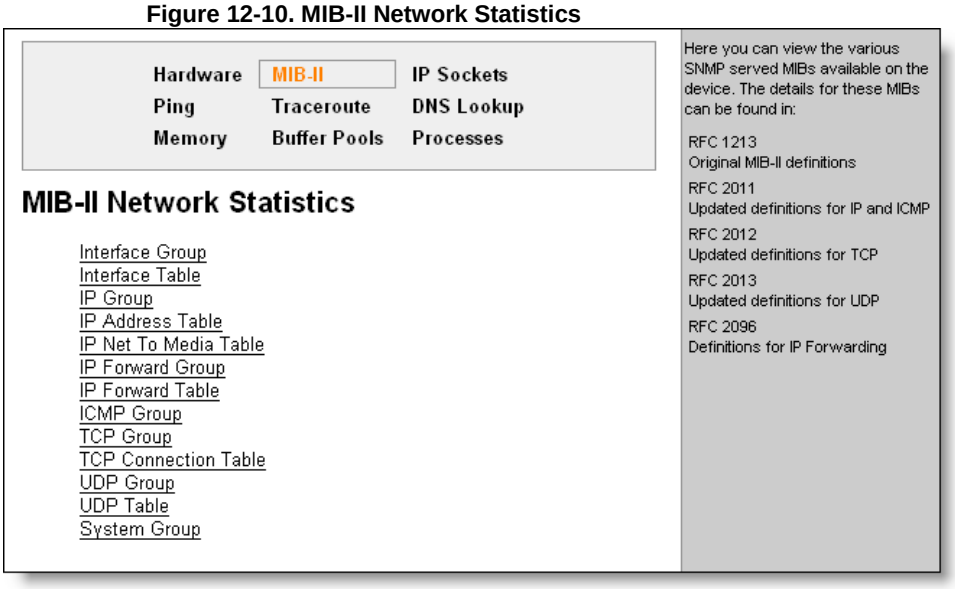
MIB-II Statistics

The MIB-II Network Statistics page shows the various SNMP-served Management Information Bases (MIBs) available on the EDS.

View EDS MIB-II statistics:

1. Click **Diagnostics** on the menu bar and then **MIB-II** at the top of the page menu. The MIB-II Network Statistics page opens.

Figure 12-10. MIB-II Network Statistics



2. Click any of the links to open the corresponding table and statistics.

   For more information, refer to the following Requests for Comments (RFCs):

RFC 1213	Original MIB-II definitions.

RFC 2011	Updated definitions for IP and ICMP.
RFC 2012	Updated definitions for TCP.
RFC 2013	Updated definitions for UDP.
RFC 2096	Definitions for IP forwarding.

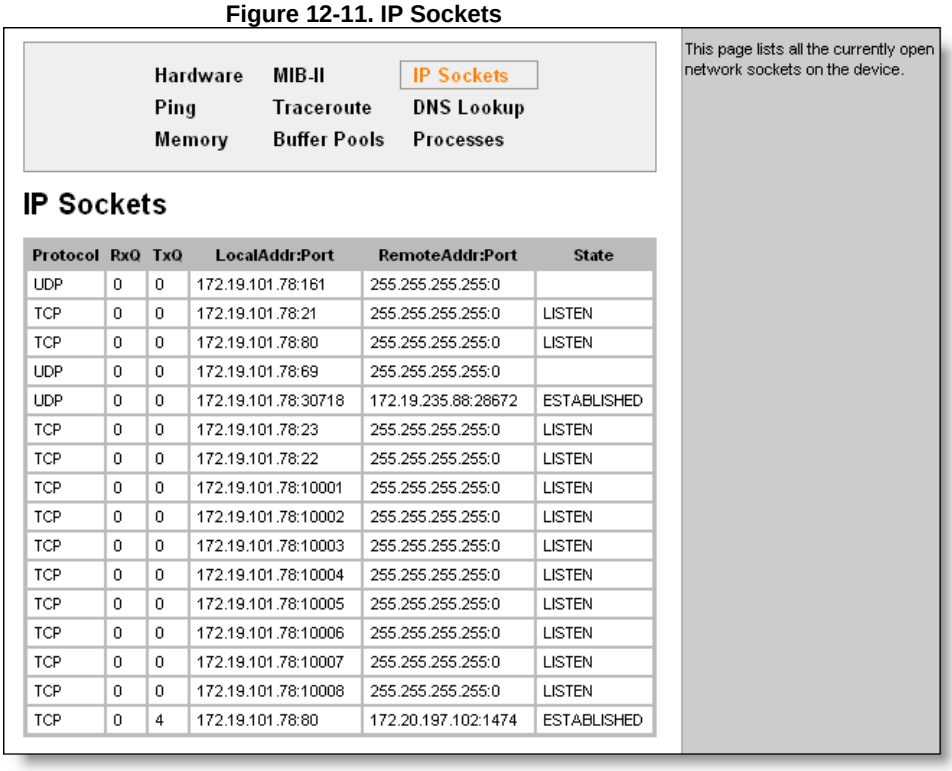
IP Sockets

The IP Sockets page opens and shows all of the open network sockets on the EDS.

Display open network sockets on the EDS:

One Step Click Diagnostics on the menu bar and then IP Sockets.

Figure 12-11. IP Sockets



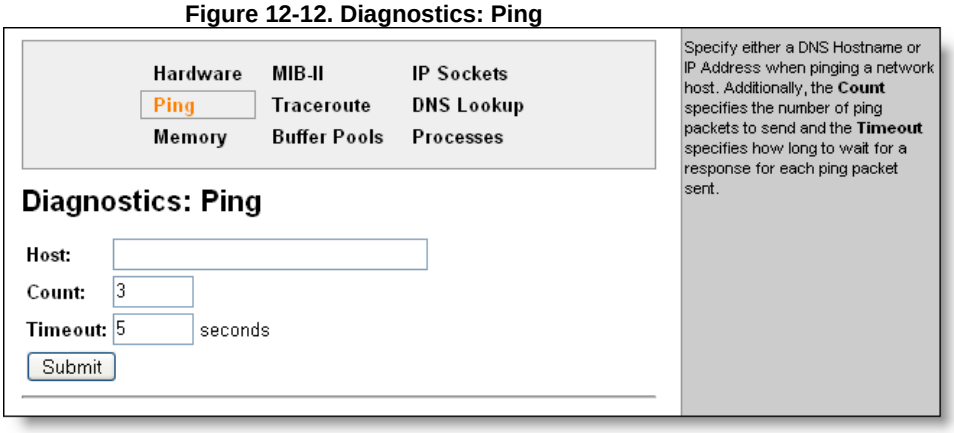
Ping

You can ping a remote device or computer from your EDS.

Ping a remote device or computer:

1. Click **Diagnostics** on the menu bar then click **Ping**. The Ping page appears.

Figure 12-12. Diagnostics: Ping



2. Enter or modify the following settings:

Diagnostics: Ping Page Settings	Description
Host	Enter the IP address or host name to ping.
Count	Enter the number of ping packets to send to the **Host**. The default is **3**.
Timeout	Enter the time, in seconds, to wait for a response from the host before timing out. The default is **5** seconds.

3. Click **Submit.** The results of the ping appear in the page.

Traceroute

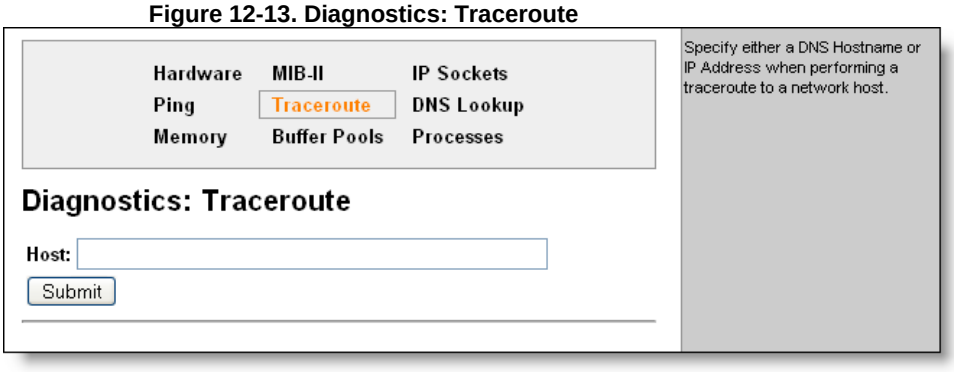
You can trace a packet from the EDS to an Internet host, showing how many hops the packet requires to reach the host and how long each hop takes.

If you visit a web site whose pages appear slowly, you can use traceroute to determine where the longest delays are occurring.

Use Traceroute from the EDS:

1. Click **Diagnostics** on the menu bar then **Traceroute** at the top of the page. The Traceroute page appears.

Figure 12-13. Diagnostics: Traceroute



2. Enter or modify the IP address or DNS hostname.

3. Click **Submit.** The results of the traceroute appear in the page.

DNS Lookup

You can specify a DNS Hostname for a forward lookup or an IP address for a reverse lookup.

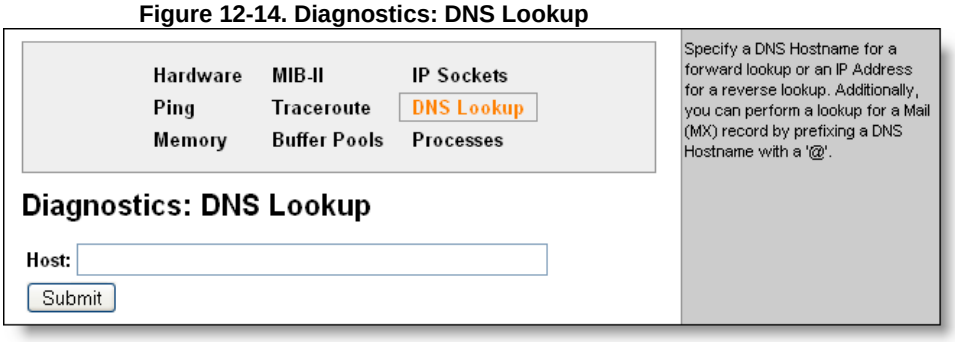
You can also perform a lookup for a Mail (MX) record by prefixing a DNS Hostname with @.

***Note**: A DNS server must be configured for DNS Lookup to work.*

Use forward or reverse DNS lookup:

1. Click **Diagnostics** on the menu bar then **DNS Lookup** at the top of the page. The Diagnostics: DNS Lookup page appears.

Figure 12-14. Diagnostics: DNS Lookup


Hardware
MIB-II
IP Sockets
Ping
Traceroute
DNS Lookup
Memory
Buffer Pools
Processes
Diagnostics: DNS Lookup
Host:
Submit
Specify a DNS Hostname for a forward lookup or an IP Address for a reverse lookup. Additionally, you can perform a lookup for a Mail (MX) record by prefixing a DNS Hostname with a '@'.

2. Enter or modify the following field:

DNS Lookup Page Setting	Description
Host	For reverse lookup to locate the hostname for that IP address, enter an IP address. For forward lookup to locate the corresponding IP address, enter a hostname. To look up the Mail Exchange (MX) record IP address, enter a domain name prefixed with @.

3. Click **Submit.** The results of the lookup appear in the page.

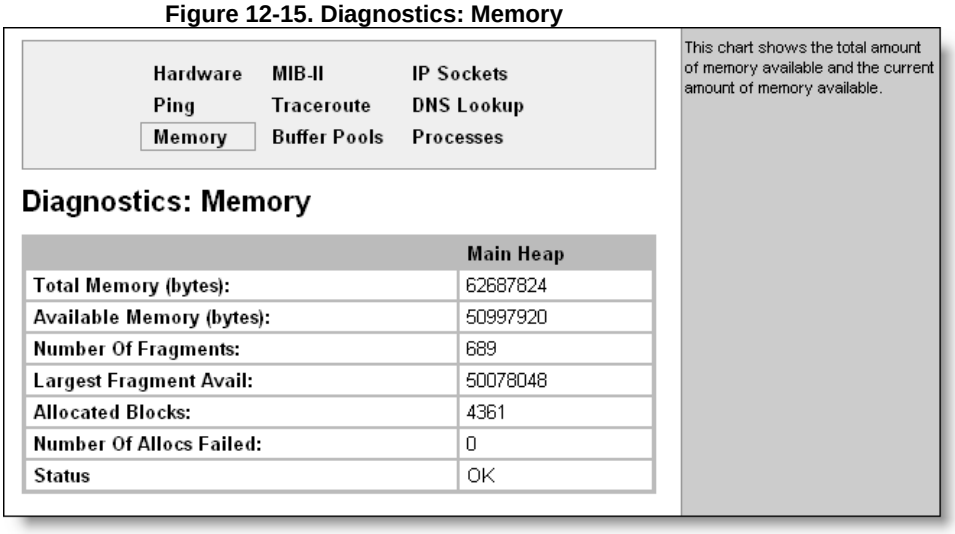
Memory

This read-only page shows the total memory and available memory (in bytes), along with the number of fragments, allocated blocks, and memory status.

Display memory statistics for the EDS:

One Step Click **Diagnostics** on the menu bar then **Memory** at the top of the page. The Diagnostics: Memory page appears.

Figure 12-15. Diagnostics: Memory



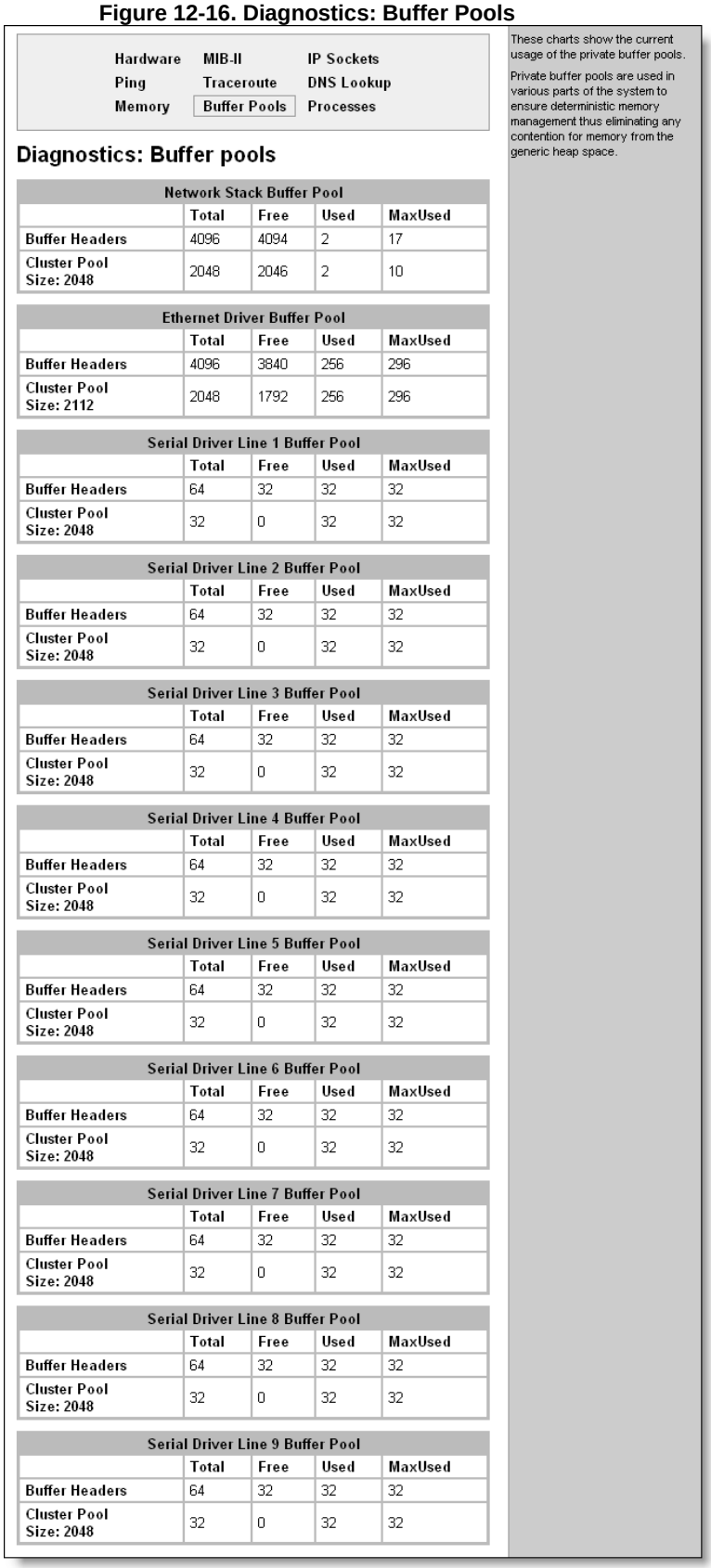
Buffer Pools

Several parts of the EDS system use private buffer pools to ensure deterministic memory management.

Display the EDS buffer pools:

One Step Click **Diagnostics** on the menu bar then **Buffer Pools** at the top of the page. The Diagnostics: Buffer Pools page appears.

Figure 12-16. Diagnostics: Buffer Pools



Hardware | MIB-II | IP Sockets
Ping | Traceroute | DNS Lookup
Memory | Buffer Pools | Processes

These charts show the current usage of the private buffer pools.

Private buffer pools are used in various parts of the system to ensure deterministic memory management thus eliminating any contention for memory from the generic heap space.

Diagnostics: Buffer pools

Network Stack Buffer Pool

	Total	Free	Used	MaxUsed
Buffer Headers	4096	4094	2	17
Cluster Pool Size: 2048	2048	2046	2	10

Ethernet Driver Buffer Pool

	Total	Free	Used	MaxUsed
Buffer Headers	4096	3840	256	296
Cluster Pool Size: 2112	2048	1792	256	296

Serial Driver Line 1 Buffer Pool

	Total	Free	Used	MaxUsed
Buffer Headers	64	32	32	32
Cluster Pool Size: 2048	32	0	32	32

Serial Driver Line 2 Buffer Pool

	Total	Free	Used	MaxUsed
Buffer Headers	64	32	32	32
Cluster Pool Size: 2048	32	0	32	32

Serial Driver Line 3 Buffer Pool

	Total	Free	Used	MaxUsed
Buffer Headers	64	32	32	32
Cluster Pool Size: 2048	32	0	32	32

Serial Driver Line 4 Buffer Pool

	Total	Free	Used	MaxUsed
Buffer Headers	64	32	32	32
Cluster Pool Size: 2048	32	0	32	32

Serial Driver Line 5 Buffer Pool

	Total	Free	Used	MaxUsed
Buffer Headers	64	32	32	32
Cluster Pool Size: 2048	32	0	32	32

Serial Driver Line 6 Buffer Pool

	Total	Free	Used	MaxUsed
Buffer Headers	64	32	32	32
Cluster Pool Size: 2048	32	0	32	32

Serial Driver Line 7 Buffer Pool

	Total	Free	Used	MaxUsed
Buffer Headers	64	32	32	32
Cluster Pool Size: 2048	32	0	32	32

Serial Driver Line 8 Buffer Pool

	Total	Free	Used	MaxUsed
Buffer Headers	64	32	32	32
Cluster Pool Size: 2048	32	0	32	32

Serial Driver Line 9 Buffer Pool

	Total	Free	Used	MaxUsed
Buffer Headers	64	32	32	32
Cluster Pool Size: 2048	32	0	32	32

Processes

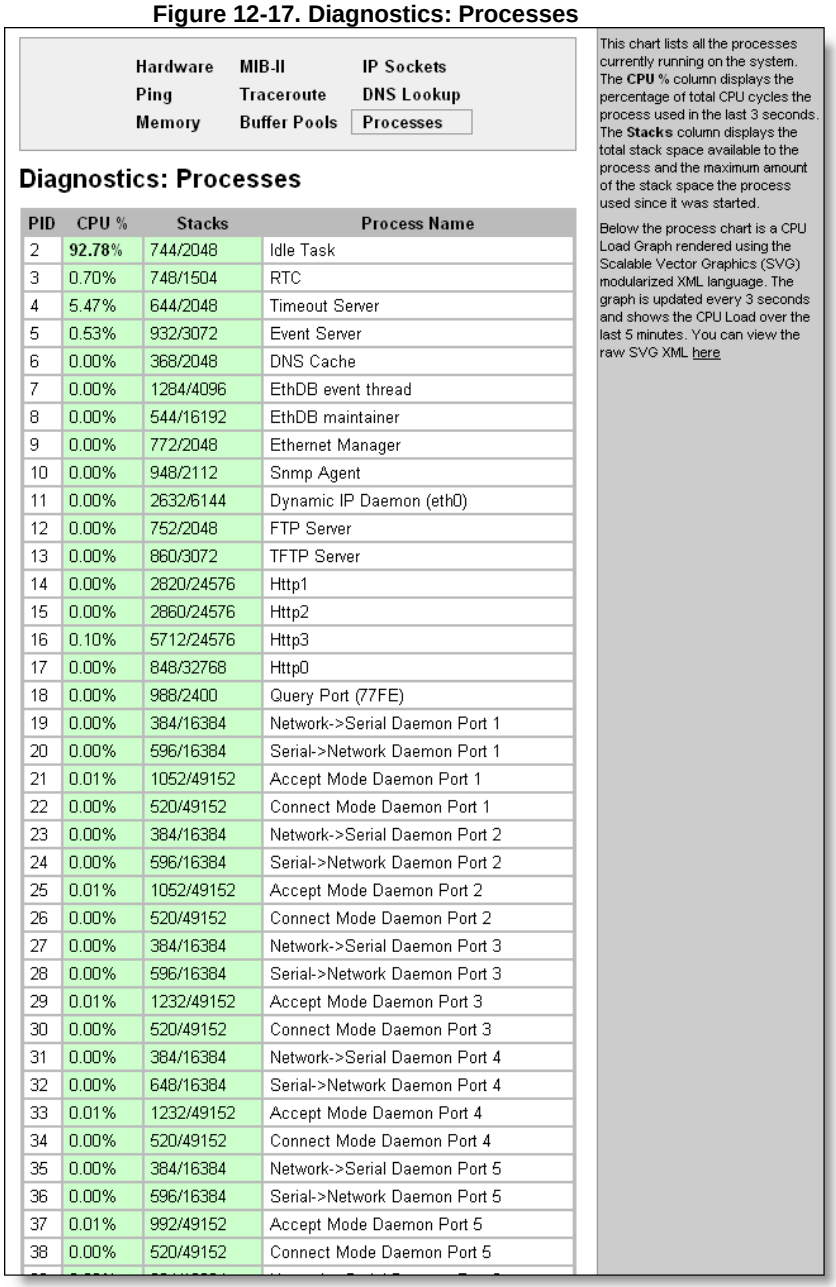
The EDS Processes page shows all the processes currently running on the system.

It shows the Process ID (PID), the percentage of total CPU cycles a process used within the last three seconds, the total stack space available, the maximum amount of stack space used by the process since it started, and the process name.

Display the processes running on the EDS:

One Step Click **Diagnostics** on the menu bar then **Processes** at the top of the page.

Figure 12-17. Diagnostics: Processes



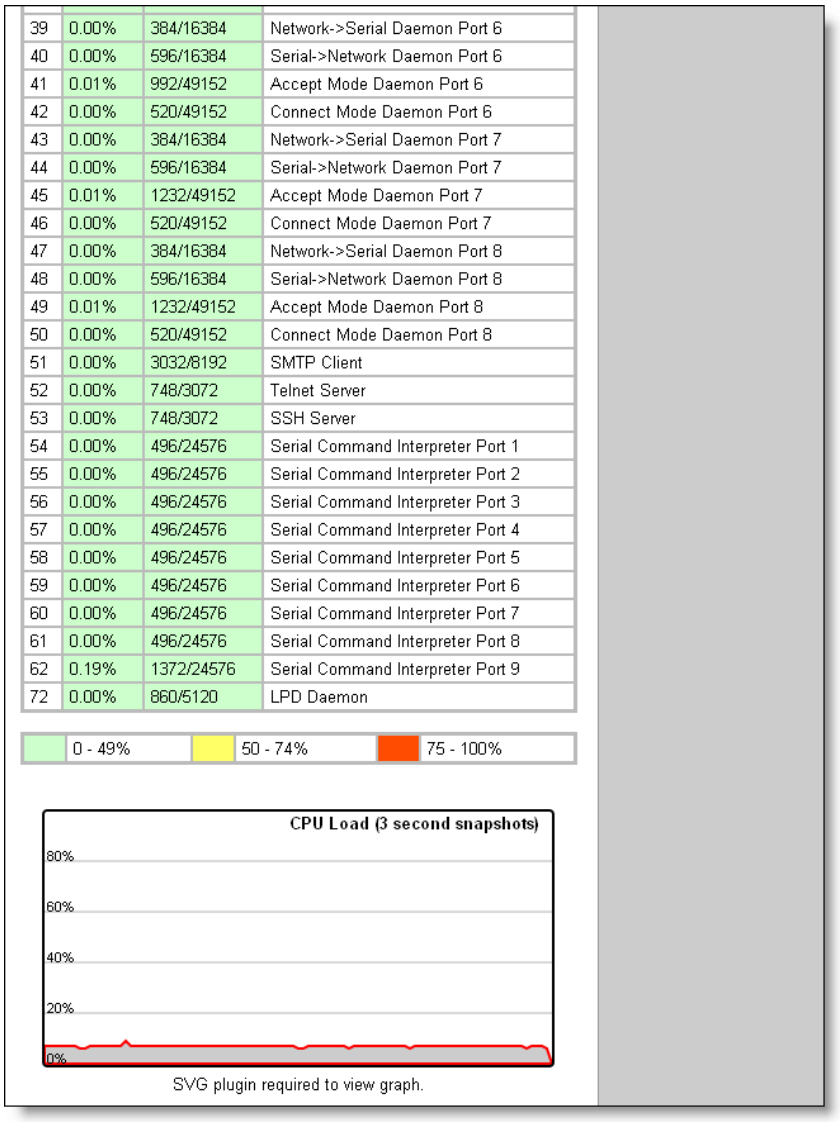
Hardware | MIB-II | IP Sockets
Ping | Traceroute | DNS Lookup
Memory | Buffer Pools | Processes

This chart lists all the processes currently running on the system. The **CPU %** column displays the percentage of total CPU cycles the process used in the last 3 seconds. The **Stacks** column displays the total stack space available to the process and the maximum amount of the stack space the process used since it was started.

Below the process chart is a CPU Load Graph rendered using the Scalable Vector Graphics (SVG) modularized XML language. The graph is updated every 3 seconds and shows the CPU Load over the last 5 minutes. You can view the raw SVG XML here

Diagnostics: Processes

PID	CPU %	Stacks	Process Name
2	**92.78%**	744/2048	Idle Task
3	0.70%	748/1504	RTC
4	5.47%	644/2048	Timeout Server
5	0.53%	932/3072	Event Server
6	0.00%	368/2048	DNS Cache
7	0.00%	1284/4096	EthDB event thread
8	0.00%	544/16192	EthDB maintainer
9	0.00%	772/2048	Ethernet Manager
10	0.00%	948/2112	Snmp Agent
11	0.00%	2632/6144	Dynamic IP Daemon (eth0)
12	0.00%	752/2048	FTP Server
13	0.00%	860/3072	TFTP Server
14	0.00%	2820/24576	Http1
15	0.00%	2860/24576	Http2
16	0.10%	5712/24576	Http3
17	0.00%	848/32768	Http0
18	0.00%	988/2400	Query Port (77FE)
19	0.00%	384/16384	Network->Serial Daemon Port 1
20	0.00%	596/16384	Serial->Network Daemon Port 1
21	0.01%	1052/49152	Accept Mode Daemon Port 1
22	0.00%	520/49152	Connect Mode Daemon Port 1
23	0.00%	384/16384	Network->Serial Daemon Port 2
24	0.00%	596/16384	Serial->Network Daemon Port 2
25	0.01%	1052/49152	Accept Mode Daemon Port 2
26	0.00%	520/49152	Connect Mode Daemon Port 2
27	0.00%	384/16384	Network->Serial Daemon Port 3
28	0.00%	596/16384	Serial->Network Daemon Port 3
29	0.01%	1232/49152	Accept Mode Daemon Port 3
30	0.00%	520/49152	Connect Mode Daemon Port 3
31	0.00%	384/16384	Network->Serial Daemon Port 4
32	0.00%	648/16384	Serial->Network Daemon Port 4
33	0.01%	1232/49152	Accept Mode Daemon Port 4
34	0.00%	520/49152	Connect Mode Daemon Port 4
35	0.00%	384/16384	Network->Serial Daemon Port 5
36	0.00%	596/16384	Serial->Network Daemon Port 5
37	0.01%	992/49152	Accept Mode Daemon Port 5
38	0.00%	520/49152	Connect Mode Daemon Port 5



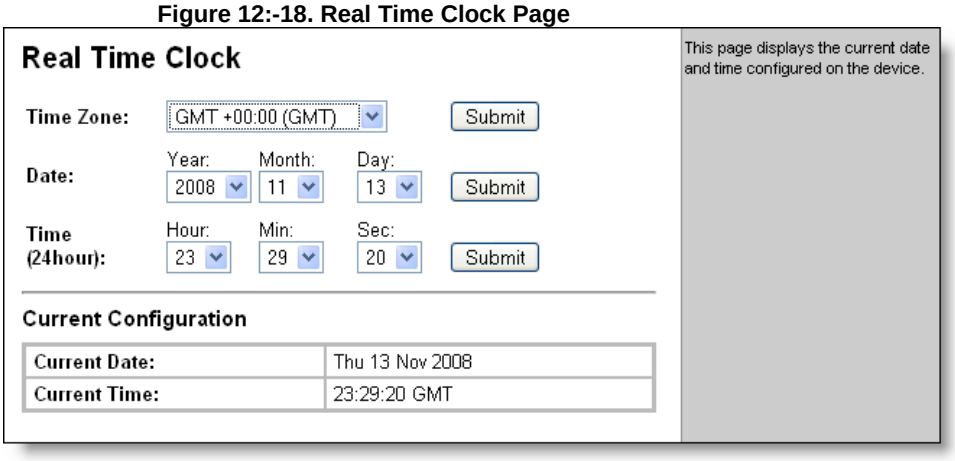
39	0.00%	384/16384	Network->Serial Daemon Port 6
40	0.00%	596/16384	Serial->Network Daemon Port 6
41	0.01%	992/49152	Accept Mode Daemon Port 6
42	0.00%	520/49152	Connect Mode Daemon Port 6
43	0.00%	384/16384	Network->Serial Daemon Port 7
44	0.00%	596/16384	Serial->Network Daemon Port 7
45	0.01%	1232/49152	Accept Mode Daemon Port 7
46	0.00%	520/49152	Connect Mode Daemon Port 7
47	0.00%	384/16384	Network->Serial Daemon Port 8
48	0.00%	596/16384	Serial->Network Daemon Port 8
49	0.01%	1232/49152	Accept Mode Daemon Port 8
50	0.00%	520/49152	Connect Mode Daemon Port 8
51	0.00%	3032/8192	SMTP Client
52	0.00%	748/3072	Telnet Server
53	0.00%	748/3072	SSH Server
54	0.00%	496/24576	Serial Command Interpreter Port 1
55	0.00%	496/24576	Serial Command Interpreter Port 2
56	0.00%	496/24576	Serial Command Interpreter Port 3
57	0.00%	496/24576	Serial Command Interpreter Port 4
58	0.00%	496/24576	Serial Command Interpreter Port 5
59	0.00%	496/24576	Serial Command Interpreter Port 6
60	0.00%	496/24576	Serial Command Interpreter Port 7
61	0.00%	496/24576	Serial Command Interpreter Port 8
62	0.19%	1372/24576	Serial Command Interpreter Port 9
72	0.00%	860/5120	LPD Daemon

***Note**: The Adobe SVG plug-in is required to view the CPU Load Graph.*

Real Time Clock Page

You can view or change the current date or time configured on the EDS.

Figure 12:-18. Real Time Clock Page



Real Time Clock Page settings

1. Modify the following settings to set change the current date and time:

Real Time Clock Page Settings	Description
Time Zone	From the drop-down list, select the time zone corresponding to the location of the EDS.
Date	From the drop-down lists, select the year, month, and day corresponding to the current date at the location of the EDS.
Time (24 hour)	From the drop-down list, select the hour, minutes, and seconds corresponding to the current time at the location of the EDS.

2. Click **Submit**.

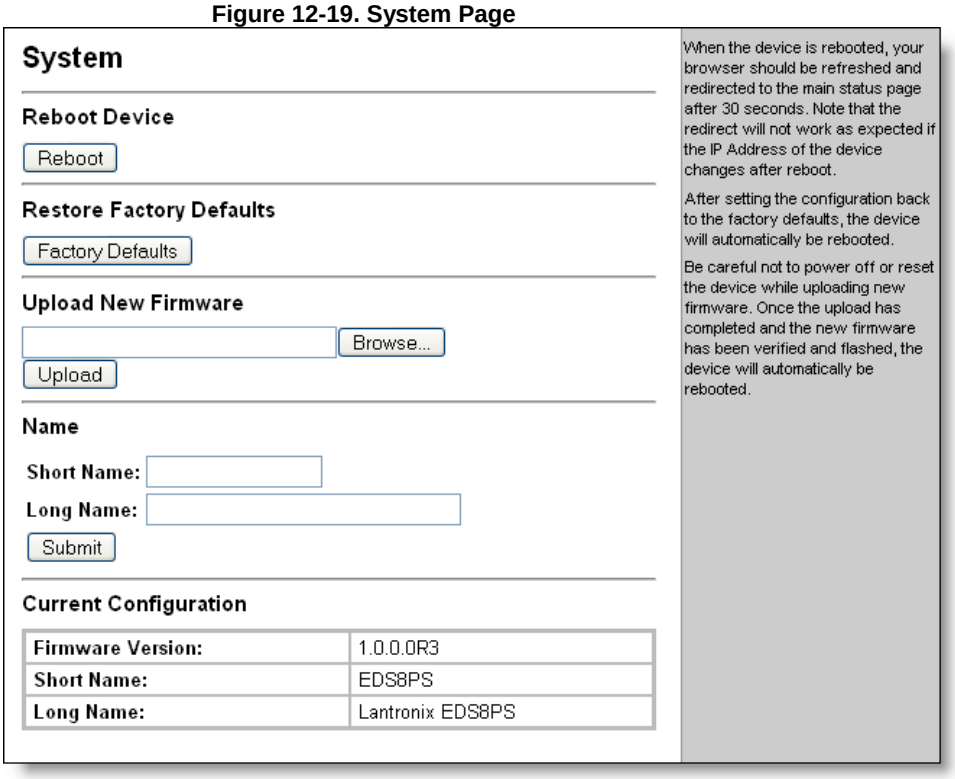
System Configuration

You can reboot the device, restore factory defaults, upload new firmware, configure the short and long name, and view the current system configuration.

Configure the EDS system settings:

1. Click **System** on the menu bar. The System page appears.

Figure 12-19. System Page


System
Reboot Device
Reboot
Restore Factory Defaults
Factory Defaults
Upload New Firmware
Browse...
Upload
Name
Short Name:
Long Name:
Submit
Current Configuration
Firmware Version: 1.0.0.0R3
Short Name: EDS8PS
Long Name: Lantronix EDS8PS
When the device is rebooted, your browser should be refreshed and redirected to the main status page after 30 seconds. Note that the redirect will not work as expected if the IP Address of the device changes after reboot.
After setting the configuration back to the factory defaults, the device will automatically be rebooted.
Be careful not to power off or reset the device while uploading new firmware. Once the upload has completed and the new firmware has been verified and flashed, the device will automatically be rebooted.

2. Configure the following settings:

System Page Settings	Description
Reboot Device	Click **Reboot** to reboot the EDS. The system refreshes and redirects the browser to the EDS home page.
Restore Factory Defaults	Click **Factory Defaults** to restore the EDS to the original factory settings. All configurations will be lost. The EDS automatically reboots upon setting back to the defaults.
Upload New Firmware	Click **Browse** to locate the firmware file location. Click **Upload** to install the firmware on the EDS. The device automatically reboots upon the installation of new firmware.
Name	Enter a new **Short Name** and a **Long Name** (if necessary). The **Short Name** maximum is 32 characters. The **Long Name** maximum is 64 characters. Changes take place upon the next reboot.

13: Advanced Settings

This chapter presents information for advanced activities, modes, and statistics.

- Email alerts.
- CLI settings.
- CLI servers on Telnet and SSH ports.
- Export or import an EDS configuration files.
- Accept Mode.
- Connect Mode.
- Disconnect Mode.
- Packing Mode.
- Modem Emulation mode.
- Serial Line Settings.
- Tunneling Statistics.

Email Configuration

You can view and configure email alerts from the EDS. This section tells you how to configure alerts. See Configure Accept Mode on page 58, and Configure Connect Mode on page 64, for how to set the triggers for the alerts.

Email Statistics

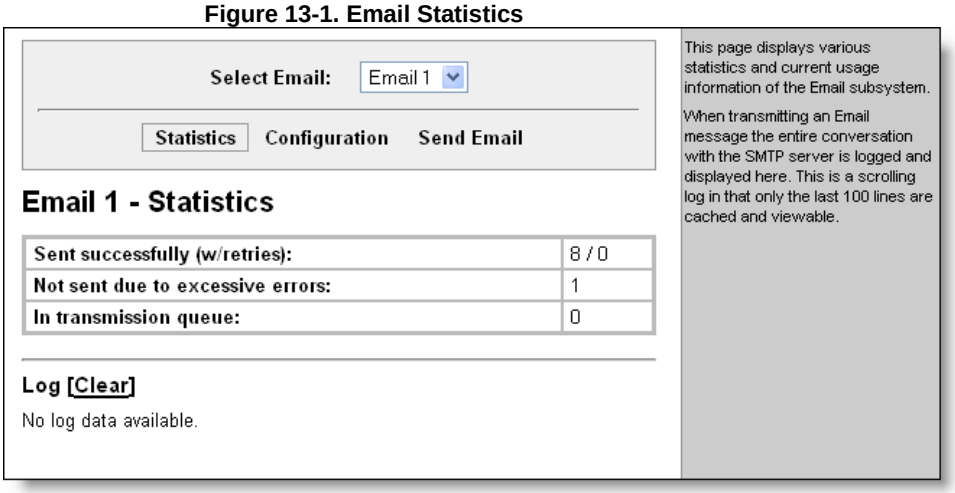
When the EDS transmits an email, the entire conversation with the SMTP server is logged and shown in the bottom portion of the EDS Statistics page.

This page shows statistics and usage information about the email subsystem.

View email statistics.

One Step Click **Email** from the main menu, then choose an email profile, from the drop down list, e.g. Email 1, then click **Statistics**.

Figure 13-1. Email Statistics


Select Email:
Email 1
Statistics
Configuration
Send Email
Email 1 - Statistics
Sent successfully (w/retries):
8 / 0
Not sent due to excessive errors:
1
In transmission queue:
0
Log [Clear]
No log data available.
This page displays various statistics and current usage information of the Email subsystem.
When transmitting an Email message the entire conversation with the SMTP server is logged and displayed here. This is a scrolling log in that only the last 100 lines are cached and viewable.

One Step To clear the log, click **Clear**.

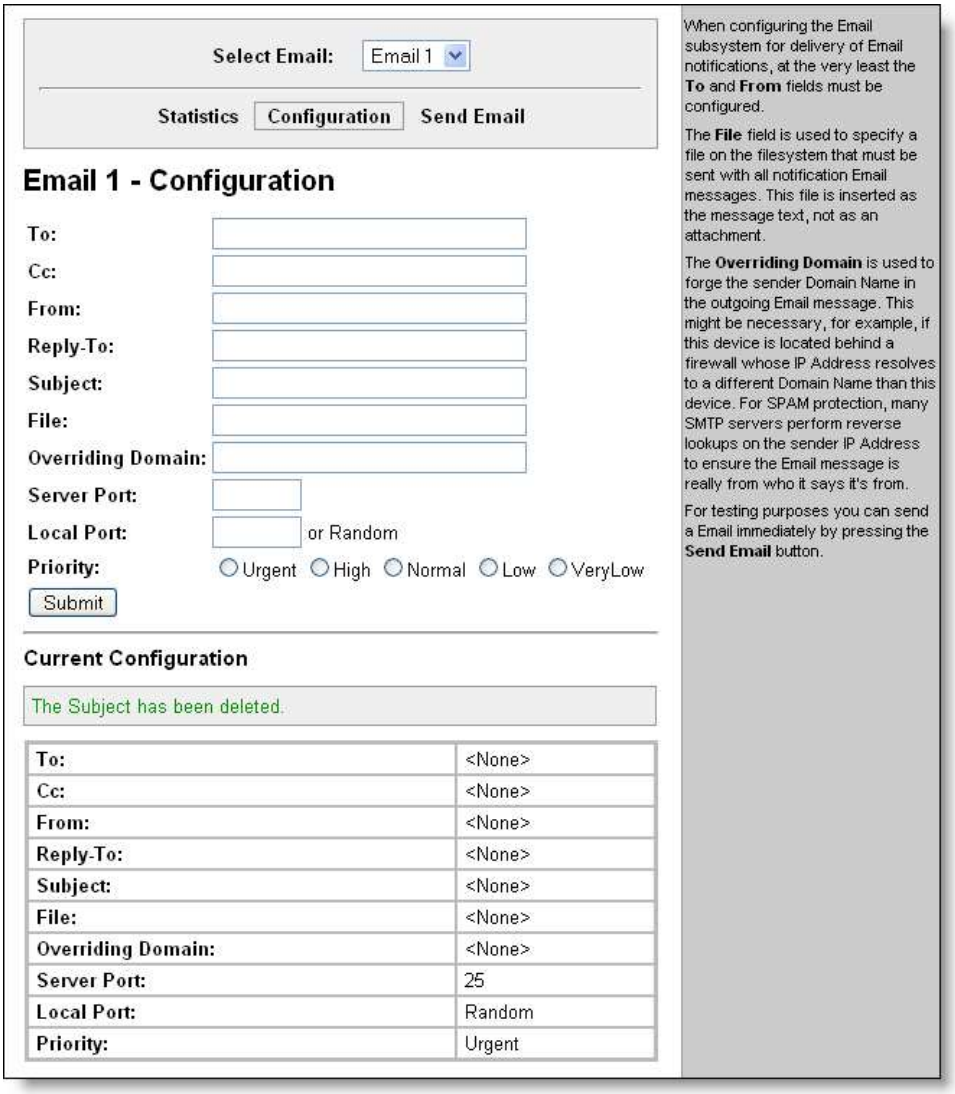
Email Configuration

You can set up to 8 email profiles. Each profile can have multiple email addresses or email address groups, separated by semicolons.

Configure EDS email settings:

1. Click **Email** on the menu bar and then **Email n** and **Configuration** at the top of the page. The Email 1 - Configuration page appears.

Figure 13-2. Email Configuration


Select Email: Email 1
Statistics
Configuration
Send Email
Email 1 - Configuration
To:
Cc:
From:
Reply-To:
Subject:
File:
Overriding Domain:
Server Port:
Local Port:
or Random
Priority:
Urgent
High
Normal
Low
VeryLow
Submit
Current Configuration
The Subject has been deleted.
To: <None>
Cc: <None>
From: <None>
Reply-To: <None>
Subject: <None>
File: <None>
Overriding Domain: <None>
Server Port: 25
Local Port: Random
Priority: Urgent
When configuring the Email subsystem for delivery of Email notifications, at the very least the To and From fields must be configured.
The File field is used to specify a file on the filesystem that must be sent with all notification Email messages. This file is inserted as the message text, not as an attachment.
The Overriding Domain is used to forge the sender Domain Name in the outgoing Email message. This might be necessary, for example, if this device is located behind a firewall whose IP Address resolves to a different Domain Name than this device. For SPAM protection, many SMTP servers perform reverse lookups on the sender IP Address to ensure the Email message is really from who it says it's from.
For testing purposes you can send a Email immediately by pressing the Send Email button.

2. Enter or modify any of the settings.
3. Click **Submit**.
4. In the **Current Configuration** table, delete currently stored settings as necessary.

One Step To test your configuration, you can send an email immediately by clicking **Send Email** at the top of the page. Refer to the Statistics page for a log of the transaction.

Command Line Interface Settings

The Command Line Interface pages enable you to view statistics about the CLI servers listening on the Telnet and SSH ports, and to configure CLI settings.

Command Line Interface Statistics

This shows the current connection status of the CLI servers listening on the Telnet and SSH ports.

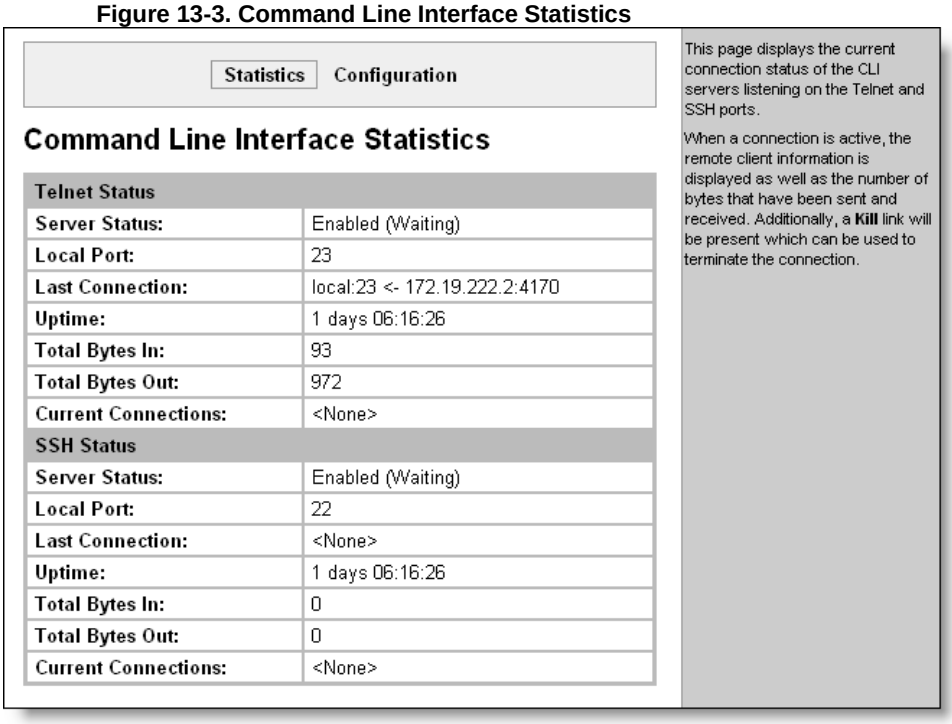
When a connection is active:

- The remote client information appears.
- The number of bytes that have been sent and received appears.
- A **Kill** link (visible when a connection is active) can be used to terminate the connection.

View command line interface statistics:

One Step Click **CLI** on the menu bar. The Command Line Interface Statistics page appears.

Figure 13-3. Command Line Interface Statistics


Statistics
Configuration
Command Line Interface Statistics
Telnet Status
Server Status: Enabled (Waiting)
Local Port: 23
Last Connection: local:23 <- 172.19.222.2:4170
Uptime: 1 days 06:16:26
Total Bytes In: 93
Total Bytes Out: 972
Current Connections: <None>
SSH Status
Server Status: Enabled (Waiting)
Local Port: 22
Last Connection: <None>
Uptime: 1 days 06:16:26
Total Bytes In: 0
Total Bytes Out: 0
Current Connections: <None>
This page displays the current connection status of the CLI servers listening on the Telnet and SSH ports.
When a connection is active, the remote client information is displayed as well as the number of bytes that have been sent and received. Additionally, a Kill link will be present which can be used to terminate the connection.

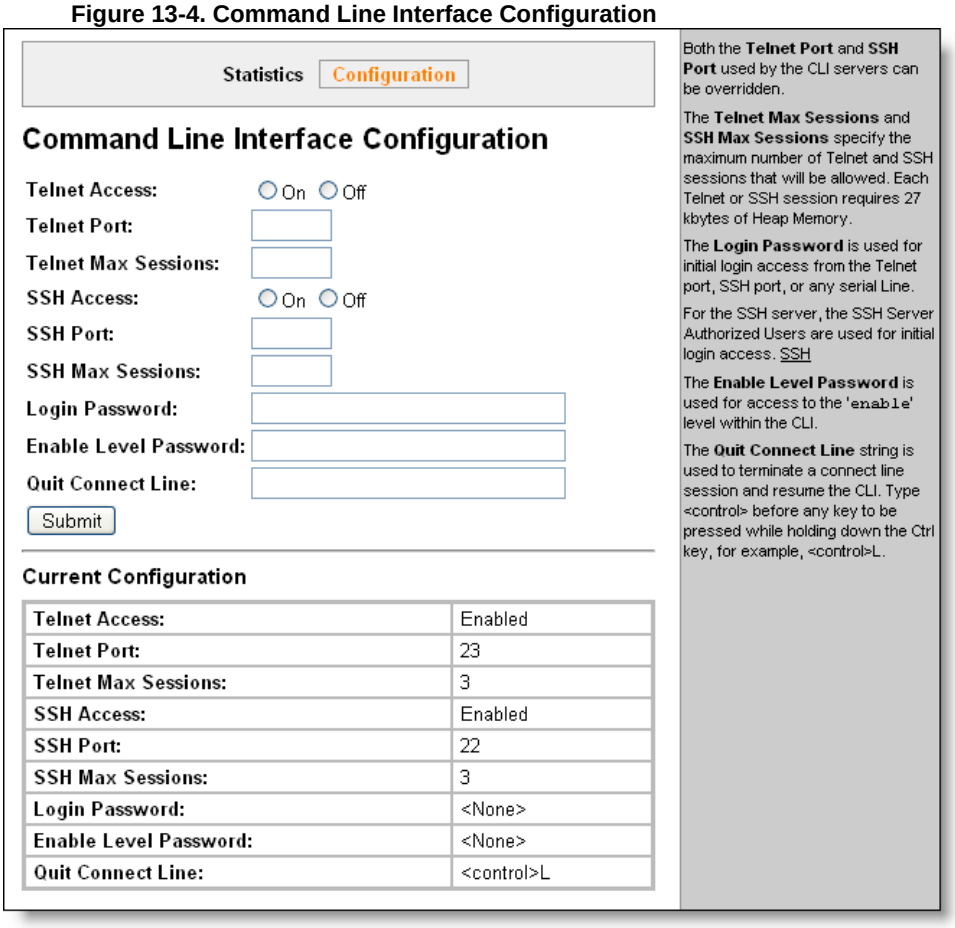
CLI Configuration

On this page you can change CLI configuration settings.

Configure the CLI:

1. Click **CLI** on the menu then **Configuration** at the top of the page. The Command Line Interface Configuration page appears.

Figure 13-4. Command Line Interface Configuration


Statistics
Configuration
Command Line Interface Configuration
Telnet Access: On Off
Telnet Port:
Telnet Max Sessions:
SSH Access: On Off
SSH Port:
SSH Max Sessions:
Login Password:
Enable Level Password:
Quit Connect Line:
Submit
Current Configuration
Telnet Access: Enabled
Telnet Port: 23
Telnet Max Sessions: 3
SSH Access: Enabled
SSH Port: 22
SSH Max Sessions: 3
Login Password: <None>
Enable Level Password: <None>
Quit Connect Line: <control>L
Both the Telnet Port and SSH Port used by the CLI servers can be overridden.
The Telnet Max Sessions and SSH Max Sessions specify the maximum number of Telnet and SSH sessions that will be allowed. Each Telnet or SSH session requires 27 kbytes of Heap Memory.
The Login Password is used for initial login access from the Telnet port, SSH port, or any serial Line.
For the SSH server, the SSH Server Authorized Users are used for initial login access. SSH
The Enable Level Password is used for access to the 'enable' level within the CLI.
The Quit Connect Line string is used to terminate a connect line session and resume the CLI. Type <control> before any key to be pressed while holding down the Ctrl key, for example, <control>L.

2. Enter or modify the following settings:

Command Line Interface Configuration Settings	Description
Telnet Access	Select **On** to enable Telnet access. Telnet is enabled by default.
Telnet Port	Enter the Telnet port to use for Telnet access. The default is **23**.
Telnet Max	Maximum number of simultaneous Telnet sessions.

Command Line Interface Configuration Settings	Description
Sessions	
SSH Access	Select **On** to enable SSH access. SSH is enabled by default.
SSH Port	Enter the SSH port to use for SSH access. The default is **22**.
SSH Max Sessions	Maximum number of simultaneous SSH sessions.
Login Password	Enter the password for Telnet access.
Enable Level Password	Enter the password for access to the Command Mode Enable level. There is no password by default.
Quit connect line	Enter a string to terminate a connect line session and resume the CLI. Type **<control>** before any key the user must press when holding down the **Ctrl** key. An example of such a string is **<control>L.**

3. Click **Submit.**

XML Configuration

The EDS allows for the configuration of units using an XML configuration file. Export a current configuration for use on other EDSs or import a saved configuration file.

XML: Export Configuration

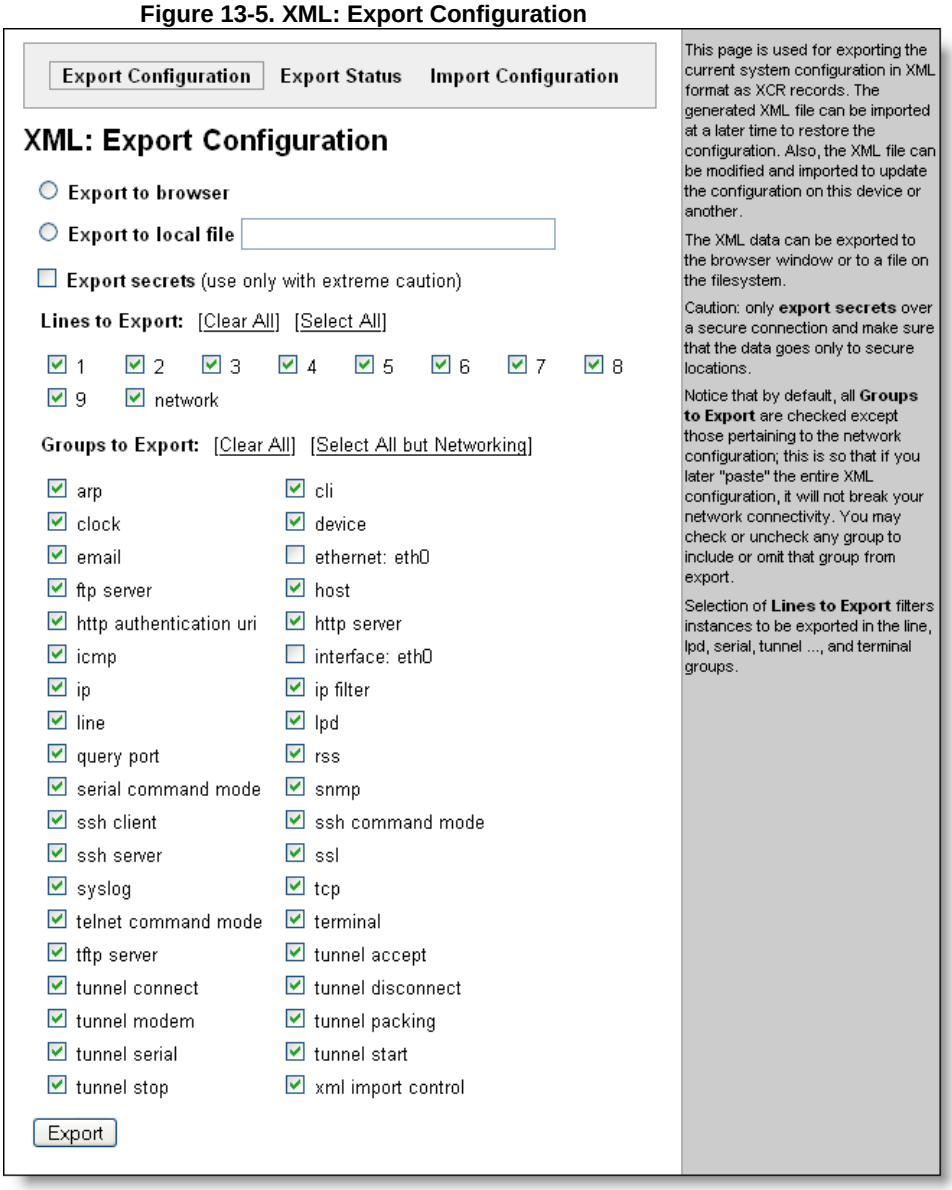
On this page you can export the current system configuration in XML format. The generated XML file can be imported later to restore a configuration. It can also be modified and imported to update the configuration on this EDS unit or another. The XML data can be exported to the browser window or to a file on the file system.

By default, all groups are selected except those pertaining to the network configuration. This is so that if you later import the entire XML configuration, it will not break your network connectivity. You may select or clear the checkbox for any group.

Export a system configuration record:

1. Click **XML** on the menu bar then **Export Configuration** at the top of the page.

Figure 13-5. XML: Export Configuration


Export Configuration
Export Status
Import Configuration
XML: Export Configuration
Export to browser
Export to local file
Export secrets (use only with extreme caution)
Lines to Export: [Clear All] [Select All]
1 2 3 4 5 6 7 8
9 network
Groups to Export: [Clear All] [Select All but Networking]
arp
clock
email
ftp server
http authentication uri
icmp
ip
line
query port
serial command mode
ssh client
ssh server
syslog
telnet command mode
tftp server
tunnel connect
tunnel modem
tunnel serial
tunnel stop
cli
device
ethernet: eth0
host
http server
interface: eth0
ip filter
lpd
rss
snmp
ssh command mode
ssl
tcp
terminal
tunnel accept
tunnel disconnect
tunnel packing
tunnel start
xml import control
Export
This page is used for exporting the current system configuration in XML format as XCR records. The generated XML file can be imported at a later time to restore the configuration. Also, the XML file can be modified and imported to update the configuration on this device or another.
The XML data can be exported to the browser window or to a file on the filesystem.
Caution: only export secrets over a secure connection and make sure that the data goes only to secure locations.
Notice that by default, all Groups to Export are checked except those pertaining to the network configuration; this is so that if you later "paste" the entire XML configuration, it will not break your network connectivity. You may check or uncheck any group to include or omit that group from export.
Selection of Lines to Export filters instances to be exported in the line, lpd, serial, tunnel ..., and terminal groups.

2. Enter or modify the following settings:

XML Export Configuration Page Settings	Description
Export to browser	Select this option to export the XCR data in the selected fields to a web browser.
Export to local file	Select this option to export the XCR data to a file on the device. If you select this option, enter a file name for the XML configuration record.

XML Export Configuration Page Settings	Description
Export secrets	Only use this with extreme caution. If selected, secret password and key information will be exported. Use only with a secure link, and save only in secure locations.
Lines to Export	Select the instances you want to export in the line, LPD, PPP, tunnel, and terminal groups.
Groups to Export	Check the configuration groups that are to be exported to the XML configuration record.

3. Click **Export**.

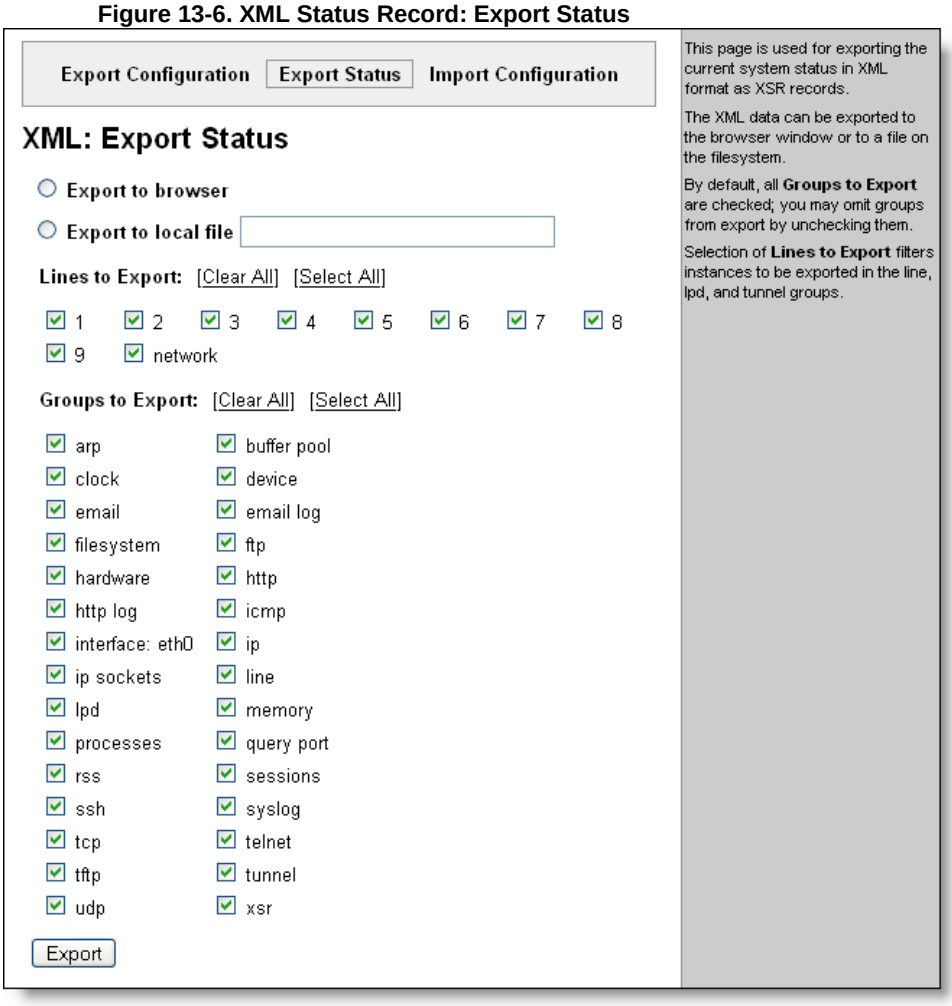
   The groups appear if exporting the data to the browser. If exporting to the file system, the file is stored on the file system.

XML: Export Status

You can export the current system status in XML format to a web browser or to a file on the file system.

1. Click **XML** on menu bar and then **Export Status** at the top of the page. The XML Status Record: Export Status page appears.

Figure 13-6. XML Status Record: Export Status



2. Enter or modify the following settings:

XML Status Record: Export System Status Page Settings	Description
Export to browser	Select this option to export the XML status record to a web browser.
Export to local file	Select this option to export the XML status record to a file on the device. If you select this option, enter a file name for the XML status record.
Lines to Export	Select the instances you want to export in the line, LPD, PPP, tunnel, and terminal groups.

XML Status Record: Export System Status Page Settings	Description
Groups to Export	Check the configuration groups that are to be exported into the XML status record.

3. Click the **Export** button.

   The groups display if exporting the data to the browser. If exporting to the file system, the file is stored on the file system.

XML: Import System Configuration Page

You can also import a system configuration from an XML file.

The XML data can be imported from a file on the file system or uploaded using HTTP. The groups to import can be specified by toggling the respective group item or entering a filter string. When toggling a group item, all instances of that group will be imported. The filter string can be used to import specific instances of a group. The text format of this string is:

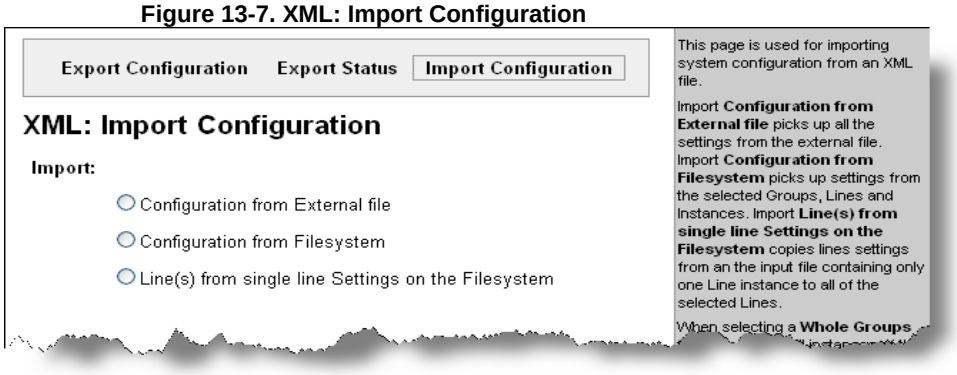
<g>:<i>;<g>:<i>;...

Each group name <g> is followed by a colon and the instance value <i>. Each <g> :<i> value is separated with a semicolon. If a group has no instance, specify the group name <g> only.

Import a system configuration:

1. Click **XML** on the menu bar and then **Import Configuration** at the top of the page. The XML: Import Configuration page appears.

Figure 13-7. XML: Import Configuration

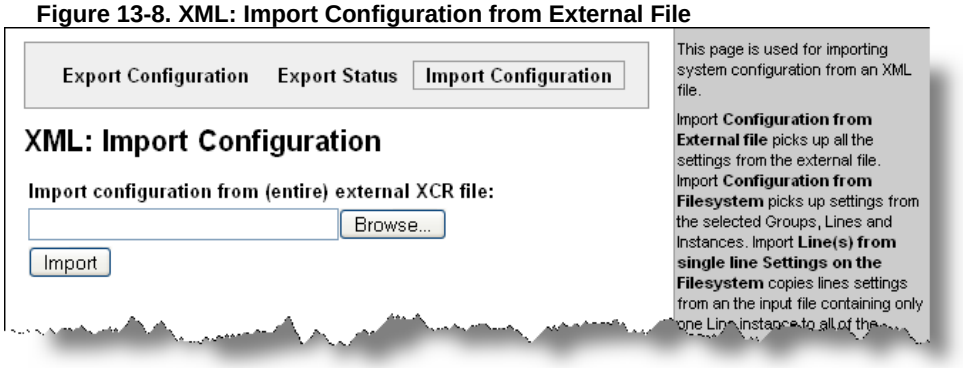

Export Configuration
Export Status
Import Configuration
XML: Import Configuration
Import:
Configuration from External file
Configuration from Filesystem
Line(s) from single line Settings on the Filesystem
This page is used for importing system configuration from an XML file.
Import Configuration from External file picks up all the settings from the external file.
Import Configuration from Filesystem picks up settings from the selected Groups, Lines and Instances. Import Line(s) from single line Settings on the Filesystem copies lines settings from an the input file containing only one Line instance to all of the selected Lines.
When selecting a Whole Groups

2. Click one of the radio buttons to select the type of source to import from.

Import Configuration from External File

This selection shows a field for entering the path and file name of the entire external XCR file to import. You can also browse to select the XCR file.

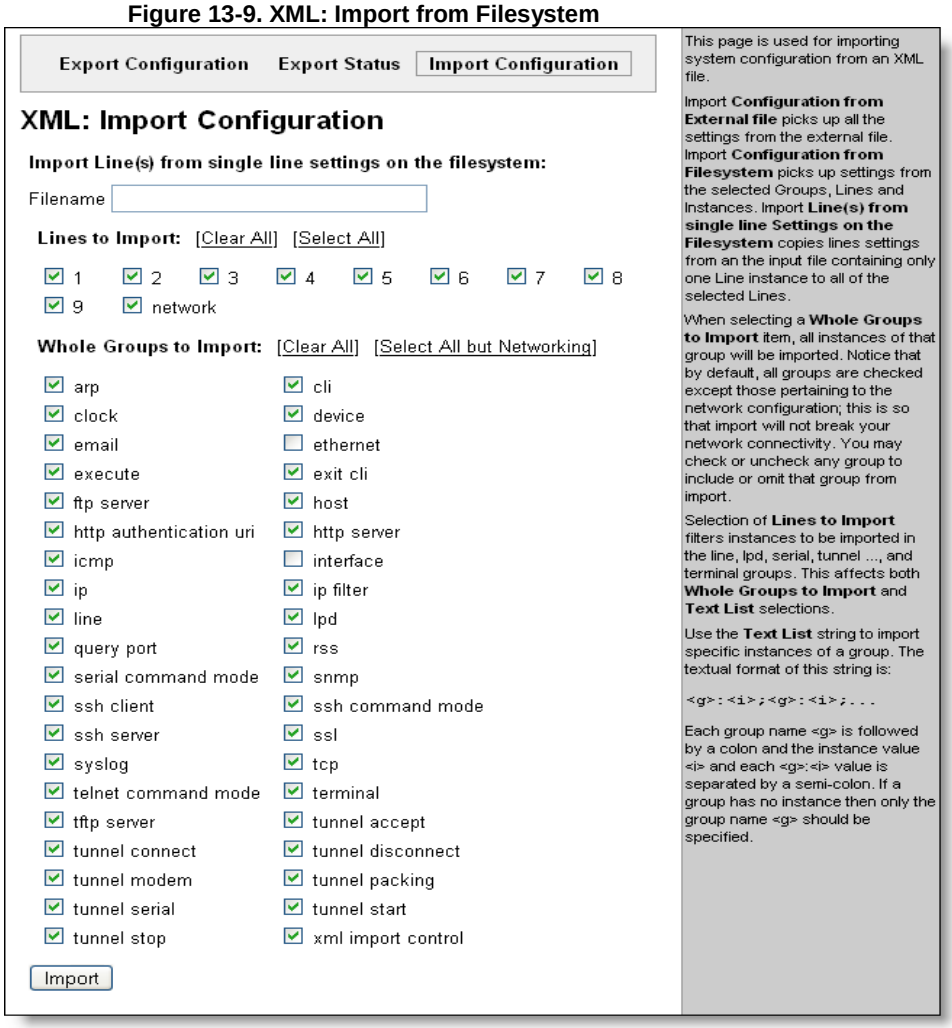
Figure 13-8. XML: Import Configuration from External File


Export Configuration
Export Status
Import Configuration
XML: Import Configuration
Import configuration from (entire) external XCR file:
Browse...
Import
This page is used for importing system configuration from an XML file.
Import Configuration from External file picks up all the settings from the external file.
Import Configuration from Filesystem picks up settings from the selected Groups, Lines and Instances. Import Line(s) from single line Settings on the Filesystem copies lines settings from an the input file containing only

Import Configuration from the Filesystem

This selection shows a page for entering the file system and your import requirements – groups, lines, and instances.

Figure 13-9. XML: Import from Filesystem


Export Configuration
Export Status
Import Configuration
XML: Import Configuration
Import Line(s) from single line settings on the filesystem:
Filename
Lines to Import: [Clear All] [Select All]
1 2 3 4 5 6 7 8
9 network
Whole Groups to Import: [Clear All] [Select All but Networking]
arp
clock
email
execute
ftp server
http authentication uri
icmp
ip
line
query port
serial command mode
ssh client
ssh server
syslog
telnet command mode
tftp server
tunnel connect
tunnel modem
tunnel serial
tunnel stop
cli
device
ethernet
exit cli
host
http server
interface
ip filter
lpd
rss
snmp
ssh command mode
ssl
tcp
terminal
tunnel accept
tunnel disconnect
tunnel packing
tunnel start
xml import control
Import
This page is used for importing system configuration from an XML file.
Import Configuration from External file picks up all the settings from the external file. Import Configuration from Filesystem picks up settings from the selected Groups, Lines and Instances. Import Line(s) from single line Settings on the Filesystem copies lines settings from an the input file containing only one Line instance to all of the selected Lines.
When selecting a Whole Groups to Import item, all instances of that group will be imported. Notice that by default, all groups are checked except those pertaining to the network configuration; this is so that import will not break your network connectivity. You may check or uncheck any group to include or omit that group from import.
Selection of Lines to Import filters instances to be imported in the line, lpd, serial, tunnel ..., and terminal groups. This affects both Whole Groups to Import and Text List selections.
Use the Text List string to import specific instances of a group. The textual format of this string is:
<g>:<i>;<g>:<i>;...
Each group name <g> is followed by a colon and the instance value <i> and each <g>:<i> value is separated by a semi-colon. If a group has no instance then only the group name <g> should be specified.

1. Enter the filename of the XCR file with the groups to import.

2. Enter or modify the following settings:

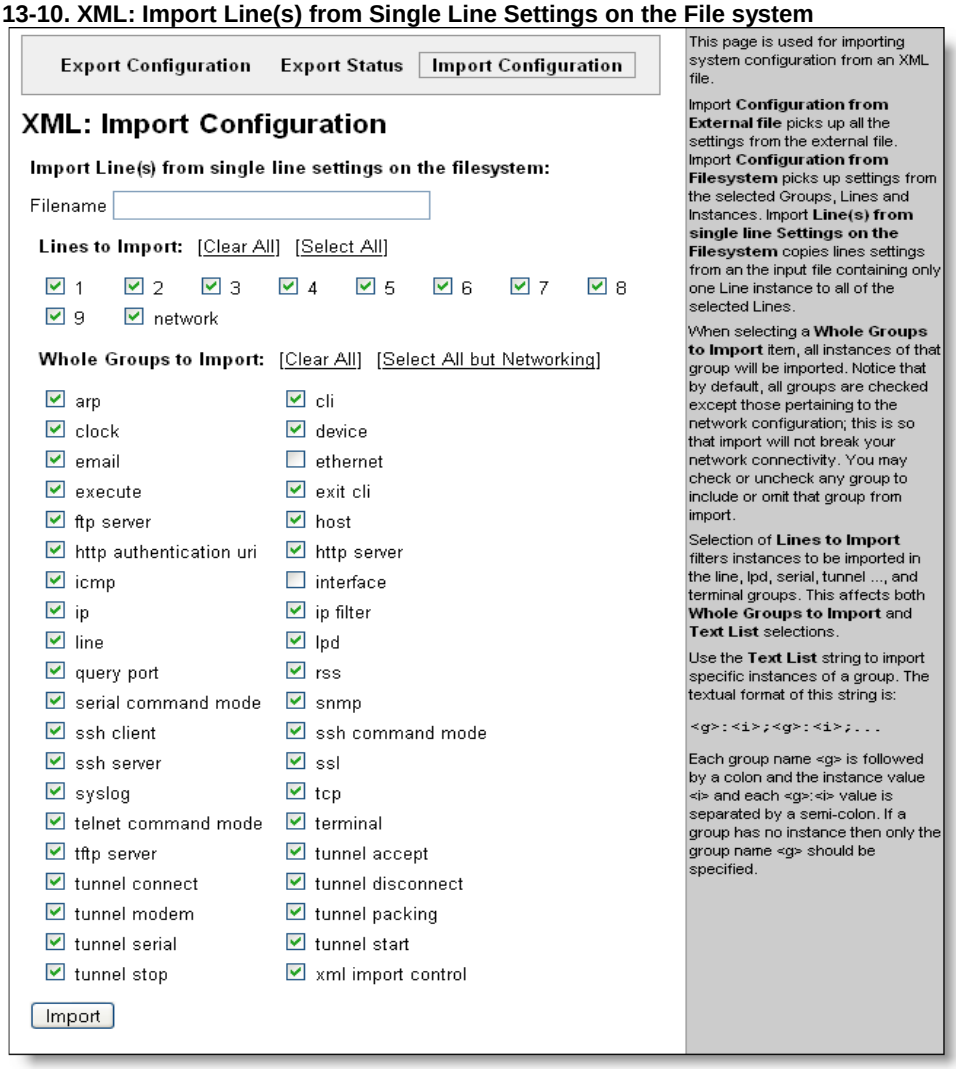
Import Configuration from File system Settings	Description
Filename	Enter the name of the file on the EDS (local to its file system) that contains XCR data.
Lines to Import	Select the lines whose settings you want to import. Click the **Select All** link to select all the serial lines and the network lines. Click the **Clear All** link to clear all of the checkboxes. By default, all line instances are selected. Only the selected line instances will be imported in the line, LPD, PPP, tunnel, and terminal groups.

Import Configuration from File system Settings	Description
Whole Groups to Import	Select the configuration groups to import from the XML configuration record. This option imports all instances of each selected group unless it is one of the **Lines to Import**. ***Note:*** *By default, all groups are checked except those pertaining to the network configuration; this is so that import will not break your network connectivity.* You may check or uncheck any group to include or omit that group from import. To import all of the groups, click the **Select All but Networking** link to import all groups. To clear all the checkboxes, click the **Clear All** link.
Text List	Enter a string to import specific instances of a group. The textual format of this string is: `<g>:<i>;<g>:<i>;...` Each group name <g> is followed by a colon and the instance value <i> and each <g>:<i> value is separated by a semi-colon. If a group has no instance, then specify the group name <g> only. Use this option for groups other than those affected by **Lines to Import**.

Import Line(s) from Single Line Settings on the File system

This selection copies line settings from the single line instance in the input file to selected lines. The import file may only contain records from a single line instance; this is done by selecting a single **Line to Export** when exporting the file.

Figure 13-10. XML: Import Line(s) from Single Line Settings on the File system


Export Configuration
Export Status
Import Configuration
XML: Import Configuration
Import Line(s) from single line settings on the filesystem:
Filename
Lines to Import: [Clear All] [Select All]
1 2 3 4 5 6 7 8
9 network
Whole Groups to Import: [Clear All] [Select All but Networking]
arp
clock
email
execute
ftp server
http authentication uri
icmp
ip
line
query port
serial command mode
ssh client
ssh server
syslog
telnet command mode
tftp server
tunnel connect
tunnel modem
tunnel serial
tunnel stop
cli
device
ethernet
exit cli
host
http server
interface
ip filter
lpd
rss
snmp
ssh command mode
ssl
tcp
terminal
tunnel accept
tunnel disconnect
tunnel packing
tunnel start
xml import control
Import
This page is used for importing system configuration from an XML file.
Import Configuration from External file picks up all the settings from the external file. Import Configuration from Filesystem picks up settings from the selected Groups, Lines and Instances. Import Line(s) from single line Settings on the Filesystem copies lines settings from an the input file containing only one Line instance to all of the selected Lines.
When selecting a Whole Groups to Import item, all instances of that group will be imported. Notice that by default, all groups are checked except those pertaining to the network configuration; this is so that import will not break your network connectivity. You may check or uncheck any group to include or omit that group from import.
Selection of Lines to Import filters instances to be imported in the line, lpd, serial, tunnel ..., and terminal groups. This affects both Whole Groups to Import and Text List selections.
Use the Text List string to import specific instances of a group. The textual format of this string is:
<g>:<i>;<g>:<i>;...
Each group name <g> is followed by a colon and the instance value <i> and each <g>:<i> value is separated by a semi-colon. If a group has no instance then only the group name <g> should be specified.

XML: Import Lines from Single Line(s) Settings

1. Enter or modify the following settings:

Import Line(s) Settings	Description
Filename	Enter the name of the file on the EDS (local to its file system) that contains XCR data.

Import Line(s) Settings	Description
Lines to Import	Select the line(s) of settings to import. Click the **Select All** link to select all the serial lines and the network lines. Click the **Clear All** link clear all of the checkboxes. By default, all serial line instances are selected.
Whole Groups to Import	Select the configuration groups to import from the XML configuration record. **Note:** *By default, all groups are checked except those pertaining to the network configuration; this is so that the import will not break your network connectivity.* You may check or uncheck any group to include or omit that group from import. To import all of the groups, click the **Select All but Networking** link to import all groups. To clear all the checkboxes, click the **Clear All** link.

14: Tunneling

Tunneling allows serial devices to communicate over a network, without "being aware" of the devices which establish the network connection between them.

Tunneling parameters are configured as described in Tunnel Settings, on page 57—or via the Command Mode Tunnel Menu (see the EDS Command Reference for the full list of commands.)

The EDS supports two tunneling connections simultaneously per serial port. One of these connections is Connect Mode; the other connection is Accept Mode. The connections on one serial port are separate from those on another serial port.

- **Connect Mode:** The EDS actively makes a connection. The receiving node on the network must listen for the Connect Mode's connection. Connect Mode is disabled by default.
- **Accept Mode:** The EDS listens for a connection. A node on the network initiates the connection. Accept Mode is enabled by default.
- **Disconnect Mode:** This mode defines how an open connection stops the forwarding of data. The specific parameters to stop the connection are configurable. Once the EDS Disconnect Mode observes the defined event occur, it will disconnect both Accept Mode and Connect Mode connections on that port.

When any character comes in through the serial port, it gets copied to both the Connect Mode connection and the Accept Mode connection (if both are active).

Connect Mode

For Connect Mode to function, it must be enabled, have a remote station (node) configured, and a remote port configured (TCP or UDP). When enabled, Connect Mode is always on.

Enter the remote station as an IP address or DNS name. The EDS will not make a connection unless it can resolve the address. For DNS names, after 4 hours of an active connection, the EDS will re-evaluate the address. If it is a different address, it will close the connection.

Connect Mode supports the following protocols:

- AES over TCP and UDP
- SSH (the EDS is the SSH client)
- SSL
- TCP

- Telnet
- UDP (Connect Mode only)

When setting AES encryption, both the encrypt key and the decrypt key must be specified. The encrypt key is used for data sent out. The decrypt key is used for receiving data. Both of the keys may be set to the same value.

For Connect Mode using UDP, the EDS accepts packets from any device on the network. It will send packets to the last device that sent it packets.

***Note**: The Local Port in Connect Mode is not the same port configured in Accept Mode.*

To ignore data sent to the EDS, enable the blocking of serial data or network data (or both).

The TCP keepalive time is the time in which probes are periodically sent to the other end of the connection. This ensures the other side is still connected.

To configure SSH, the SSH client username must be configured.

In Connect Mode, the EDS is the SSH client. Ensure the EDS SSH client username is configured on the remote SSH server before using it with the EDS.

Connect Mode has six states:

- Disabled (no connection)
- Enabled (always makes a connection)
- Active if it sees any character from the serial port
- Active if it sees a specific (configurable) character from the serial port
- Modem control signal
- Modem emulation

For the “any character” or “specific character” connection states, the EDS waits and retries the connection if the connection cannot be made. Once it makes a connection and then disconnects, it will not reconnect until it sees any character or the start character again (depending on the configured setting).

Configure the Modem Control Asserted setting (for DSR or DTR) to start a Connect Mode connection when the signal is asserted. The EDS will try to make a connection indefinitely. If the connection closes, it will not make another connection unless the signal is asserted again.

Accept Mode

In Accept Mode, the EDS waits for a connection from the network. The configurable local port is the port the remote device connects to for this connection. There is no remote port or address. The default local port is 10001 for serial port 1 and 10002 for serial port 2.

Accept Mode supports the following protocols:

- SSH (the EDS is the server in Accept Mode). When using this protocol, the SSH server host keys and at least one SSH authorized user must be configured.

- SSL
- TCP
- AES encryption over TCP
- Telnet (The EDS supports IAC codes. It drops the IAC codes when Telneting and does not forward them to the serial port).

Accept Mode has the following states:

- Disabled (never a connection)
- Enabled (always listening for a connection)
- Active if it receives any character from the serial port
- Active if it receives a specific (configurable) character from the serial port (same start character as Connect Mode's start character)
- Modem control signal
- Modem emulation

Disconnect Mode

Disconnect Mode ends Accept Mode and Connect Mode connections. When disconnecting, the EDS shuts down connections gracefully.

The following settings end a connection:

- The EDS receives the stop character.
- The timeout period has elapsed and no activity is going in or out of the EDS. Both Accept Mode and Connect Mode must be idle for the time frame.
- The EDS observes the modem control inactive setting.

***Note**: To clear data from serial buffers on disconnect, enable "Flush Serial Data".*

Packing Mode

Packing Mode takes data from the serial port, groups it together, and sends it out to nodes on the network. The groupings may be configured by size or by time intervals.

The following settings are configurable for Packing Mode:

- Disabled
- **Timeout**: The data is packed for a specified period before being sent out. Specifies the time duration in milliseconds; applies only if the Packing Mode is Timeout.
- **Threshold**: When the buffer fills to this specified amount of data in bytes (and the timeout has not elapsed), the EDS packs the data and sends it out; applies only if the Packing Mode is not Disabled.
- **Send Character**: The data is packed until the specified send character is encountered. Similar to a start or stop character, the EDS packs the data until it sees the send character. The EDS then sends the packed data and the send character in the packet. Applies only if the Packing Mode is Send Character.

- **Trailing Character**: If a trailing character is defined, this character is appended to data put on the network immediately following the send character.

Modem Emulation

The EDS supports Modem Emulation mode for devices that send out modem signals. There are two different modes supported:

Command Mode: sends back verbal response codes.

Data Mode: information transferred in is also transferred out.

You can change the default settings for verbose response codes, echo commands, and quiet mode, by using Command Mode commands. The current settings can be overridden; however on reboot, it will go back to the programmed settings.

One Step Configure the connect string as necessary. The connect string appends to the communication packet when the modem connects to a remote location. You can append additional text to the connect message.

Command Mode

The Modem Emulation Command Mode supports the standard AT command set. For a list of available commands from the serial or Telnet login, enter **AT?**. Use **ATDT**, **ATD**, and **ATDP** to establish a connection:

All of these commands simulate a modem.

For commands that are valid but not applicable to the EDS, an “OK” message is sent, but the command is silently ignored.

The EDS attempts to make a Command Mode connection as per the IP/DNS/port numbers defined in Connect Mode. It is possible to override the remote address, as well as the remote port number.

By default, the +++ characters are not passed through the connection. Turn on this capability using the **modem echo pluses** configurable.

Command	Description
+++	Switches to Command Mode if entered from serial port during connection.
AT?	Help.
ATDT <Address Info>	Establishes the TCP connection to socket (<IP>:<port>).
ATDP <Address Info>	See ATDT.
ATD	Like ATDT. Dials default Connect Mode remote address and port.
ATD <Address Info>	Sets up a TCP connection. A value of 0 begins a command line interface session.
ATO	Switches to data mode if connection still exists. Vice versa to

Command	Description
	'+++'.
ATEn	Switches echo in Command Mode (off - 0, on - 1).
ATH	Disconnects the network session.
ATI	Shows modem information.
ATQn	Quiet mode (0 - enable results code, 1 - disable results code.)
ATVn	Verbose mode (0 - numeric result codes, 1 - text result codes.)
ATXn	Command does nothing and returns OK status.
ATUn	Accept unknown commands. (n value of 0 = off. n value of 1 = on.)
AT&V	Display current and saved settings.
AT&F	Reset settings in NVR to factory defaults.
AT&W	Save active settings to NVR.
AT&Z	Restore active settings from NVR.
ATZ	Restores active settings from defaults.
ATS0=n	Accept incoming connection. n value of 0 = disable n value of 1 = connect automatically n value of 2+ = connect with ATA command.
ATA	Answer incoming connection (if ATS0 is 2 or greater).
A/	Repeat last valid command.

For ATDT and ATDP commands from 1 to 255, the EDS uses the configured Connect Mode remote station address and replaces the last segment with the number provided. The same applies if two segments are provided. For example, if the configured address is 100.255.15.5, entering “ATDT 16.6” results in 100.255.16.6.

When using ATDT and ATDP, enter 0 to switch to the Command Line Interface (CLI). Once the CLI is exited, the EDS reverts to modem emulation mode.

One Step

Configure either the IP address using the address (<xxx.xxx.xxx.xxx>), or the IP address and port number <xxx.xxx.xxx.xxx>:<port> . The port number cannot be entered on its own.

—Or—

You may specify a hostname instead of an IP address.

Serial Line Settings

Serial line settings are configurable for both serial Line n and serial line 2.

Configure the buffer size to change the maximum amount of data the serial port stores. For any active connection, the EDS sends the data in the buffer.

The modem control signal DTR on the Line may be continually asserted or asserted only while either an Accept Mode tunnel or a Connect Mode tunnel is connected.

Statistics

The EDS logs statistics for tunneling.

The **Dropped** statistic shows connections ended by the remote location.

The **Disconnects** statistic shows connections ended by the EDS.

15: Security in Detail

The EDS supports Secure Shell (SSH) and Secure Sockets Layer (SSL).

Secure Shell: SSH

SSH is a network protocol for securely accessing a remote device. This protocol provides a secure, encrypted communication channel between two hosts over a network.

Two roles require configuration: when the EDS acts as the SSH server and when it acts as an SSH client. The SSH server is used by the CLI (Command Mode) and for tunneling in Accept Mode. The SSH client is for tunneling in Connect Mode.

SSH Server Configuration

You can configure the EDS as an SSH server. There are two requirements:

- **SSH Host Keys** or key pairs: private and public keys. These keys are used for the Diffie-Hellman key exchange, the underlying encryption protocol. The EDS represents its keys in the Open SSH format.
- **Authorized Users**: users permitted to connect to the EDS SSH server.

You use the SSH Server Configuration page to satisfy both of these requirements—creating or importing host keys, and defining Authorized Users.

The SSH Host Keys can be created by one or more methods:

- You can use the EDS to generate the keys for you.

—Or—

- You can use PuTTY to generate keys.

—Or—

- You can use other tools to generate RFC4716-format keys.

The steps for each of these methods are described below.

Use the EDS to Generate the Keys:

1. Click **SSH → SSH Server: Host Keys** at the top of the page. The SSH Server: Host Keys page appears.
2. Under **Create New Keys**, select the key type, **RSA** or **DSA**.
3. Select the **Bit Size**, 512, 768, or 1024.

4. Click **Submit**.

Generate and use keys from PuTTY:

1. Create the keys with puttygen.exe. The keys are in PuTTY format.
2. Use puttygen.exe again to convert the private key to Open SSH format as follows:
   a. Import the private key using “Conversions…Import key.”
   b. Create a new file using “Conversions…Export OpenSSH key.”
3. Use ssh-keygen to convert the public key to OpenSSH format.

   `ssh-keygen -i -f putty_file > openssh_file`
4. Click **SSH → SSH Server: Host Keys** at the top of the page. The SSH Server: Host Keys page appears.
5. Locate the Private Key and Public Key files using the Browse button.
6. Select the **Key Type, RSA** or **DSA** (RSA is more secure).
7. Click **Submit**.

Use RFC4716-format Keys

1. Use any program that can produce keys in the RFC4716 format.
2. Use ssh-keygen to convert the format to OpenSSH.

   `ssh-keygen -i -f RFC4716_file > output_file`
3. Click **SSH → SSH Server: Host Keys** at the top of the page. The SSH Server: Host Keys page appears.
4. Locate the Private Key and Public Key files using the Browse button.
5. Select the **Key Type, RSA** or **DSA** (RSA is more secure).
6. Click **Submit**.

Specify Authorized Users.

1. Click **SSH → SSH Server: Authorized Users** at the top of the page. The SSH Server: Authorized Users page appears.
2. Enter the **Username** and **Password** for authorized users.
3. If available: locate the **Public RSA Key** or the **Public DSA Key** file by clicking **Browse**. Configuring a public key results in public key authentication and bypasses password queries.
4. Click **Add/Edit**. The Authorized User is added.

SSH Client Configuration

To configure the EDS as an SSH client, there is one requirement:

- An SSH client must have been configured and exists on the remote SSH server.

Configure SSH client settings:

1. Click **SSH → SSH Client: Users** at the top of the page. The SSH Client: Users page appears.

2. (Required) Enter the **Username** and **Password** to authenticate with the SSH server.

3. (Optional) Complete the SSH client user information as necessary.

   The **Private Key** and **Public Key** automate the authentication process; when configured and the user public key is known on the remote SSH server, the SSH server does not require a password. (Or, generate new keys using the **Create New Keys** section.)

   The **Remote Command** is provided to the SSH server upon connection. It specifies the application to execute upon connection.

   The default is a command shell.

***Note**: Configuring the SSH client known hosts is optional. It prevents Man-In-The-Middle (MITM) attacks.*

Secure Sockets Layer (SSL)

SSL uses digital certificates for authentication and cryptography against eavesdropping and tampering.

Sometimes only the server is authenticated, sometimes both server and client. The EDS can be server and/or client, depending on the application.

Public key encryption systems exchange information and keys and set up the encrypted tunnel.

Efficient symmetric encryption methods encrypt the data going through the tunnel after it is established. Hashing provides tamper detection.

Applications that can make use of SSL are Tunneling and Secure Web Server.

The EDS supports SSLv3 and its successors, TLS1.0 and TLS1.1.

***Note**: An incoming SSLv2 connection attempt is answered with an SSLv3 response. If the initiator also supports SSLv3, SSLv3 handles the rest of the connection.*

Cipher Suites

The SSL standard defines only certain combinations of certificate type, key exchange method, symmetric encryption, and hash method. Such a combination is called a cipher suite.

EDS currently supports the following list of cipher suites:

Certificate	Key exchange	Encryption	Hash
DSA	DHE	3DES	SHA1
RSA	RSA	128 bits AES	SHA1
RSA	RSA	Triple DES	SHA1
RSA	RSA	128 bits RC4	MD5
RSA	RSA	128 bits RC4	SHA1
RSA	1024 bits RSA	56 bits RC4	MD5
RSA	1024 bits RSA	56 bits RC4	SHA1
RSA	1024 bits RSA	40 bits RC4	MD5

Whichever side is acting as server decides which cipher suite to use for a connection. It is usually the strongest common denominator of the cipher suite lists supported by both sides.

Certificates

The goal of a certificate is to authenticate its sender. It is like a paper document that contains personal identification information and is signed by an authority, for example a notary or government agency.

Security Certificate Principles

To sign other certificates, the authority uses a private key.

- The published authority certificate contains the matching public key that allows another to verify the signature but not recreate it.
- The authority's certificate can be signed by itself, resulting in a self-signed or trusted-root certificate, or by another (higher) authority, resulting in an intermediate authority certificate.
- You can build up a chain of intermediate authority certificates, and the last certification will always be a trusted-root certificate.

An authority that signs other's certificates is also called a Certificate Authority (CA).

- The last in line is then the root-CA.
- VeriSign is a famous example of such a root-CA. Its certificate is often built into web browsers to allow verifying the identity of website servers, which need to have certificates signed by VeriSign or another public CA.

Since obtaining a certificate signed by a CA that is managed by another company can be expensive, it is possible to become your own CA. Tools exist to generate self-signed CA certificates or to sign other certificates.

- A certificate before it is signed is known as a certificate request, which only contains the identifying information. Signing it makes it a certificate.

- A certificate is also used to sign any message transmitted to the peer to identify the originator and prevent tampering while transported.

In short:

- When using HTTPS, SSL Tunneling in Accept mode, and/or EAP-TLS, the EDS needs a personal certificate with matching private key to identify itself and sign its messages.
- When using SSL Tunneling in Connect mode and/or EAP-TLS, EAP-TTLS or PEAP, the EDS needs the authority certificate(s) that can authenticate those it wishes to communicate with.

RSA or DSA

As mentioned above, the certificates contain a public key. Different key exchange methods require different public keys and thus different styles of certificate. The EDS supports key exchange methods that require a RSA-style certificate and key exchange methods that require a DSA-style certificate.

If only one of these certificates is stored in the EDS, only those key exchange methods that can work with that style certificate are enabled. RSA is sufficient in most cases.

Obtaining a Certificate and Private Key

You can obtain a certificate by completing a certificate request and sending it to a certificate authority that will create a certificate/key combo, usually for a fee. Or generate your own. A few utilities exist to generate self-signed certificates or sign certificate requests. The EDS also has the ability to generate its own self-signed certificate/key combo.

You can use XML to export the certificate in PEM format, but you cannot export the key. Hence the internal certificate generator can only be used for certificates that are to identify that particular EDS.

Certificates and private keys can be stored in several file formats. Best known are PKCS12, DER and PEM. Certificate and key can be in the same file or in separate files. The key can be encrypted with a password or not. The EDS currently only accepts separate PEM files. The key needs to be unencrypted.

Utilities

Several utilities exist to convert between the formats.

OpenSSL

OpenSSL is a widely used open source set of SSL related command line utilities. It can act as server or client. It can generate or sign certificate requests. It can convert from and to all kinds of formats.

Signing other certificate requests is also possible with OpenSSL.

Executables are available for Linux and Windows.

See www.openssl.org or www.madboa.com/geek/openssl for more information.

Generate a self-signed RSA certificate/key combo:

```
openssl req -x509 -nodes -days 365 -newkey rsa:1024 -keyout
mp_key.pem -out mp_cert.pem
```

Steel Belted Radius

Steel Belted Radius (SBR) is a commercial radius server by Juniper Networks that provides a GUI administration interface. It also provides a certificate request and self-signed certificate generator. The self-signed certificate has extension `.sbrpvk` and is in the PKCS12 format. OpenSSL can convert this into a PEM format certificate and key:

```
openssl pkcs12 -in sbr_certkey.sbrpvk -nodes -out
sbr_certkey.pem
```

The `sbr_certkey.pem` file contains both certificate and key. If loading the SBR certificate into EDS as an authority, you will need to edit it.

1. Open the file in any plain text editor.

2. Delete all info before `"----- BEGIN CERTIFICATE-----"`and after `"----- END CERTIFICATE-----", ` and then save as `sbr_cert.pem`.

   SBR accepts trusted-root certificates in the DER format. Again, OpenSSL can convert any format into DER:

   ```
   openssl x509 -inform pem -in mp_cert.pem -outform der -out
   mp_cert.der
   ```

Note: *With SBR, when the identity information includes special characters such as dashes and periods, SBR changes the format it uses to store these strings and becomes incompatible with the current EDS release. We will add support for this and other formats in future releases.*

FreeRadius

Free Radius is a Linux open-source Radius server. It is versatile, but complicated to configure.

16: Branding the EDS

The EDS Web Manager and Command Mode (CLI) are customizable.

Web Manager Customization

Customize the Web Manager's appearance by modifying index.html and style.css. The style (fonts, colors, and spacing) of the Web Manager are controlled with style.css and the text and graphics are controlled with index.html.

The Web Manager files are hidden and incorporated directly into the firmware image but may be overridden by placing the appropriate file in the appropriate directory on the EDS file system. Web Manager files can be retrieved and overridden with the following procedure:

1. ftp to the MatchPort b/g Pro
2. mkdir http/config
3. cd http/config
4. get <filename>
5. modify the file to your liking, or create a new one with the same name
6. put <filename>
7. quit

The overriding files will now appear in the file system's http/config directory. Restart any open browser to view the changed effects.

If you wish to go back to the default files in the firmware image, simply delete the overriding files from the file system**.**

.

Command Mode

Customize the EDS Command Mode by changing its short name and long name. The short name is used for show commands:

```
(enable)# show EDS
```

The long and short names appear in the Product Type field in the following format:

```
Product Type: <long name> (<short name>)
```

For example:

```
(enable)# show EDS
Product Information:
   Product Type: Lantronix EDS (EDS)
```

Change the EDS short and long names with the Web Manager:

1. Click **System** in the menu bar. The System page opens.
2. In the **Short Name** field, enter the new short name for the device (up to 32 characters).
3. In the **Long Name** field, enter the new long name for the device (up to 64 characters).
4. Click **Submit**.
5. To apply changes, click **Reboot**.

17: Updating Firmware

Obtaining Firmware

Obtain the most up-to-date firmware and release notes for the unit from the Lantronix Web site (http://www.lantronix.com/) or by anonymous FTP: (ftp://ftp.lantronix.com/).

Loading New Firmware

You can reload the firmware using the EDS Web Manager File system page.

Upload new firmware:

1. Unzip the files and save them to a directory on your PC.
2. From the EDS main web page, click **System** in the menu bar. The System page appears.
3. In the **Upload New Firmware** section, click **Browse**. A pop-up page appears. Locate the firmware file previously unzipped to your PC. It will have an extension of .romz.
4. Click **Upload** to install the firmware on the EDS. The device automatically reboots on the installation of new firmware.

—Or—

You can update firmware by sending the file to the EDS over an FTP connection. The device automatically reboots on the installation of new firmware.

A: Technical Support

If you are unable to resolve an issue using the information in this document, please contact Technical Support:

Technical Support US

Check our online knowledge base or send a question to Technical Support at http://www.lantronix.com/support.

Technical Support Europe, Middle East, Africa

Phone: +33 13 930 4172
Email: eu_techsupp@lantronix.com or eu_support@lantronix.com

Firmware downloads, frequently asked questions (FAQs), and the most up-to-date documentation are available at http://www.lantronix.com/support

When you report a problem, please provide the following information:

- Your name, and your company name, address, and phone number
- Lantronix model number
- Lantronix serial number
- Firmware version (on the first screen shown when you Telnet to the device and type **show**)
- Description of the problem
- Status of the unit when the problem occurred (please try to include information on user and network activity at the time of the problem)
- Additionally, it may be useful to export and submit the XML Configuration and XML Status files

B: Binary to Hexadecimal Conversions

Many of the unit's configuration procedures require you to assemble a series of options (represented as bits) into a complete command (represented as a byte). The resulting binary value must be converted to a hexadecimal representation.

Use this chapter to learn to convert binary values to hexadecimals or to look up hexadecimal values in the tables of configuration options. The tables include:

- Command Mode (serial string sign-on message)
- AES Keys

Converting Binary to Hexadecimal

Following are two simple ways to convert binary numbers to hexadecimal notation.

Conversion Table

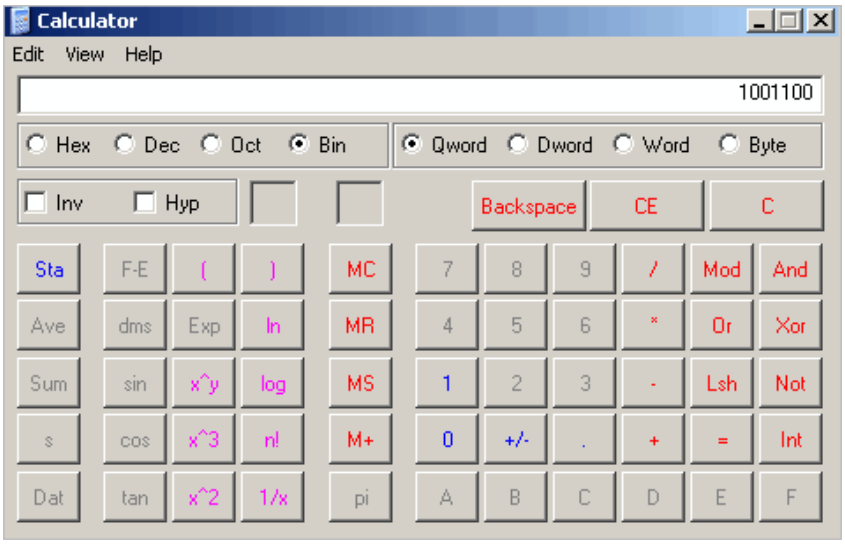
Hexadecimal digits have values ranging from 0 to F, which are represented as 0-9, A (for 10), B (for 11), etc. To convert a binary value (for example, 0100 1100) to a hexadecimal representation, treat the upper and lower four bits separately to produce a two-digit hexadecimal number (in this case, 4C). Use the following table to convert values from binary to hexadecimal.

Decimal	Binary	Hex
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

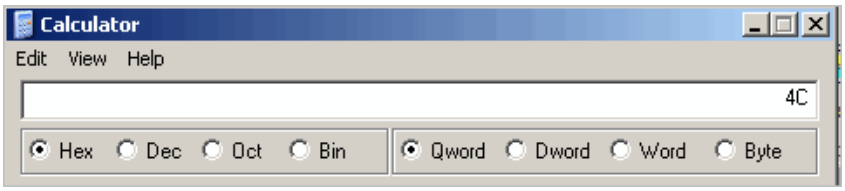
Scientific Calculator

Another simple way to convert binary to hexadecimal is to use a scientific calculator, such as the one available on the Windows operating systems. For example:

1. On the Windows Start menu, click **Programs→Accessories→Calculator**.
2. On the View menu, select **Scientific**. The scientific calculator appears.
3. Click **Bin** (Binary), and type the number you want to convert.


Calculator
Edit View Help
1001100
Hex Dec Oct Bin
Qword Dword Word Byte
Inv Hyp
Backspace CE C
Sta F-E ( ) MC 7 8 9 / Mod And
Ave dms Exp ln MR 4 5 6 * Or Xor
Sum sin x^y log MS 1 2 3 - Lsh Not
s cos x^3 n! M+ 0 +/- . + = Int
Dat tan x^2 1/x pi A B C D E F

4. Click **Hex**. The hexadecimal value appears.



C: Lantronix Cables and Adapters

Lantronix cables and adapters for use with the EDS devices are listed here according to part number and application.

Lantronix P/N	Description	Applications
500-103	6’ RJ45-to DB9F	Included with EDS8/16/32PR for setup or device connectivity. Connects the RJ45 RS232 serial ports of EDS8/16/32PR to a DB9M DTE interface of a PC or serial device.
200.2062	Cable Ethernet CAT5; RJ45, 2 m (6.6 ft)	Connects the EDS8/16/32PR Ethernet ports to an Ethernet switch/hub or is used for cascading from one EDS8/16/32PR to another. Connects the EDS8/16/32PR serial RJ45 RS232 ports to a device using one of the adapters listed below.
200.2063	Cable Ethernet CAT5; RJ45, 5 m (16.4 ft)	Connects the EDS8/16/32PR Ethernet ports to an Ethernet switch/hub or is used for cascading from one EDS8/16/32PR to another. Connects the EDS8/16/32PR serial RJ45 RS232 ports to a device using one of the below listed adapters.
200.2064	Cable Ethernet CAT5; RJ45, 10 m (32.8 ft)	Connects the EDS8/16/32PR Ethernet ports to an Ethernet switch/hub or is used for cascading from one EDS8/16/32PR to another. Connects the EDS8/16/32PR serial RJ45 RS232 ports to a device using one of the adapters listed below.
200.2065	Cable Ethernet CAT5; RJ45, 15 m (49.2 ft)	Connects the EDS8/16/32PR Ethernet ports to an Ethernet switch/hub or is used for cascading from one EDS8/16/32PR to another. Connects the EDS8/16/32PR serial RJ45 RS232 ports to a device using one of the adapters listed below.
200.2066A	Adapter RJ45-to-DB25M	Allows a standard straight-pinned CAT5 cable to connect the EDS8/16/32PR RJ45 serial ports to the DB25F DTE interface of

Lantronix P/N	Description	Applications
		a serial device.
200.2067A	Adapter RJ45-to-DB25F	Allows a standard straight-pinned CAT5 cable to connect the EDS8/16/32PR RJ45 serial ports to the DB25M DTE interface of a serial device.
200.2069A	Adapter RJ45-to-DB9M	Allows a standard straight-pinned CAT5 cable to connect the EDS8/16/32PR RJ45 serial ports to the DB9F DCE interface of a serial device.
200.2070A	Adapter RJ45-to-DB9F	Allows a standard straight-pinned CAT5 cable to connect the EDS8/16/32PR to the DB9M DTE interface of a PC or serial device.
200.2073	Adapter RJ45-to-DB25M	Allows a standard straight-pinned CAT5 cable to connect the EDS8/16/32PR RJ45 serial ports to the DB25F DCE interface of a serial device.
200.2074	Adapter RJ45-to-DB25F	Allows a standard straight-pinned CAT5 cable to connect the EDS8/16/32PR RJ45 serial ports to the DB25M DCE interface of a serial device.
ADP010104-01	Adapter "Rolled" RJ45-to-RJ45	Allows a standard straight-pinned CAT5 cable to connect the EDS8/16/32 to an RJ45 console port on products from Cisco and other manufacturers.

D: Compliance

The following compliances are according to ISO/IEC Guide 22 and EN 45014.

Manufacturer's Name & Address:
Lantronix 15353 Barranca Parkway, Irvine, CA 92618 USA

Declares that the following product:

Product Name and Model: EDS4100 4 Port Device Server, EDS16PR 16 Port Device Server, and EDS32PR 32 Port Device Server, EDS8PS 8 Port Device Server, and EDS16PS 16 Port Device Server,

Conform To The Following Standards Or Other Normative Documents:

Radiated and conducted emissions

Class B limits of EN 55022:1998

EN55024: 1998 + A1: 2001

Direct & Indirect ESD

EN61000-4-2: 1995

RF Electromagnetic Field Immunity

EN61000-4-3: 1996

Electrical Fast Transient/Burst Immunity

EN61000-4-4: 1995

Surge Immunity

EN61000-4-5: 1995

RF Common Mode Conducted Susceptibility

EN61000-4-6: 1996

Power Frequency Magnetic Field Immunity

EN61000-4-8: 1993

Voltage Dips and Interrupts

EN61000-4-11: 1994

Manufacturer's Contact:

Director of Quality Assurance, Lantronix

15353 Barranca Parkway, Irvine, CA 92618 USA

Tel: 949-453-3990

Fax: 949-453-3995

RoHS Notice:

All Lantronix products in the following families are China RoHS-compliant and free of the following hazardous substances and elements:

- Lead (Pb)
- Cadmium (Cd)
- Mercury (Hg)
- Hexavalent Chromium (Cr (VI))
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ethers (PBDE)

Product Family Name	Toxic or hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr (VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
UDS1100 and 2100	0	0	0	0	0	0
EDS	0	0	0	0	0	0
MSS100	0	0	0	0	0	0
IntelliBox	0	0	0	0	0	0
XPress DR & XPress-DR+	0	0	0	0	0	0
SecureBox 1101 & 2101	0	0	0	0	0	0
WiBox	0	0	0	0	0	0
UBox	0	0	0	0	0	0
MatchPort	0	0	0	0	0	0
SLC	0	0	0	0	0	0
XPort	0	0	0	0	0	0
WiPort	0	0	0	0	0	0
SLB	0	0	0	0	0	0
SLP	0	0	0	0	0	0
SCS	0	0	0	0	0	0
SLS	0	0	0	0	0	0
DSC	0	0	0	0	0	0

O: toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.
X: toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

Lithium Battery Notice

WARNING: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

ACHTUNG: WIRD BEIM BATTERIEWECHSEL EINE FALSCHE BATTERIE EINGESETZT, BESTEHT EXPLOSIONSGEFAHR. SETZEN SIE NUR EINE BATTERIE DES GLEICHEN ODER EINES ENTSPRECHENDEN, VOM HERSTELLER EMPFOHLENEN TYPS EIN. ENTSORGEN SIE VERBRAUCHTE BATTERIEN GEMÄSS DEN ANWEISUNGEN DES HERSTELLERS.

Installationsanweisungen

Rackmontage

Bei Montage in ein geschlossenes Rack oder in ein Rack mit mehreren Einheiten ist unter Umständen eine weitere Prüfung erforderlich. Folgende Punkte sind zu berücksichtigen.

5. Die Umgebungstemperatur innerhalb des Racks kann höher sein als die Raumtemperatur. Die Installation muss so durchgeführt werden, dass der für den sicheren Betrieb erforderliche Luftstrom nicht beeinträchtigt wird. In dieser Umgebung darf die maximale Temperatur von 50℃ nicht überschritten werden. Dabei sind auch die maximalen Auslegungstemperaturen zu berücksichtigen.

6. Die Installation ist so durchzuführen, dass auch bei ungleichmäßiger Lastverteilung die Stabilität gewährleistet bleibt.

Energiezufuhr

Anhand der Angaben auf dem jeweiligen Typenschild ist sicherzustellen, dass keine Überlastung an der Einspeisung erfolgt, die den Überstromschutz und die Versorgungsleitungen beeinträchtigt .

Erdung

Eine zuverlässige Schutzerdung dieser Ausrüstung muss gewährleistet sein. Dies gilt besonders bei Anschluss an Mehrfachsteckdosen.

Installation Instructions

Rack Mounting

If rack mounted units are installed in a closed or multi-unit rack assembly, they may require further evaluation by certification agencies. You must consider the following items:

7. The ambient conditions within the rack may be greater than the room conditions. Installation should be so that the amount of air flow required for safe operation is not compromised. The maximum temperature for the equipment in this environment is 50℃. Consideration should be given to the maximum rated ambient conditions.

8. Installation should be so that a hazardous stability condition is not achieved due to uneven loading.

Input Supply

Check nameplate ratings to assure there is no overloading of supply circuits that have an effect on over current protection and supply wiring.

Grounding

Reliable earthing of this equipment must be maintained. Particular attention should be given to supply connections when connecting to power strips, rather than direct connections to the branch circuit strips.

E: Warranty

For details on the Lantronix warranty replacement policy, go to our web site at http://www.lantronix.com/support/warranty/index.html

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